

Electrical Motor And Power Generating Equipment Test Solution



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Motor Blocked Rotor Test



ITECH solution

- IT6000C wide range high power programmable DC power supply

IT6522C wide range high power programmable DC power supply

- 80V/120A/3kW

Test Methods

By using power supply IT6500C to simulate/replace the battery , to power the motor , and test the motor working conditions , voltage/current changes under off load and blocked rotor status.

| Vehicle Headlight Dimming Motor Test

ITECH solution

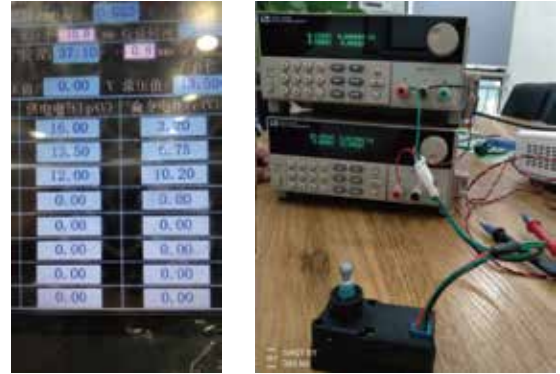
- IT6122B high accuracy high speed DC power supply
- IT6300 Multi- channel DC power supply

DUT and application

By the input signal of the height position sensor, which is converted into a voltage signal via algorithm, the headlight is controlled by control module drives the motor to control the headlight adjustment.

Test requirement

The motor is driven by the IT6122B under list function analog control; The voltage signal provided by IT6300 to simulate voltage signal of the position of the dimming sensor.



Vehicle headlight dimming motor test

Test process

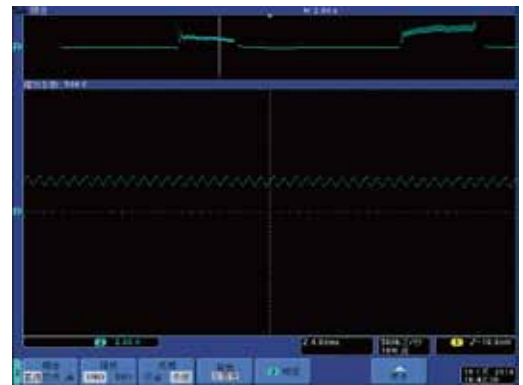
The following is the motor supply voltage and sensor output signal under three adjustment positions.

Motor Ripple simulation test

ITECH MODEL: IT8811 120V/30A/150W

Test requirement

- (1) The device needs to be able to adjust the duty cycle of the ripple. One cycle is 500-1000 Hz.
- (2) The ripple shape is similar to sinusoidal. The change trend is stable and no distortion, as shown right.



| Wind Turbine Simulation Test

ITECH model:

IT7600 High Performance programmable AC power supply
+ IT-E760 boosting module

Test requirement

Simulate the output of the wind turbine and conduct related tests; the wind turbine adopts the triangle connection method, and the output voltage is 690V AC.



IT7624 (300V/12A/1500VA)



Motor Ripple simulation test

ITECH model

IT8811 120V/30A/150W



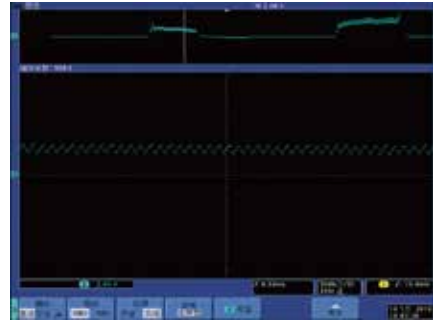
Test requirement

- (1) The device needs to be able to adjust the duty cycle of the ripple. One cycle is 500-1000 Hz.
- (2) The ripple shape is similar to sinusoidal. The change trend is stable and no distortion, as shown below.

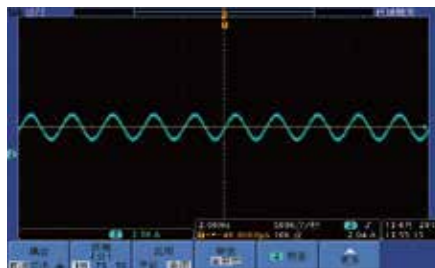
Test process

In CC mode, use PC software to edit the List step to realize the full and half wave of the sine wave, simulate the motor ripple waveform, and the period is 500Hz and 1000Hz respectively.

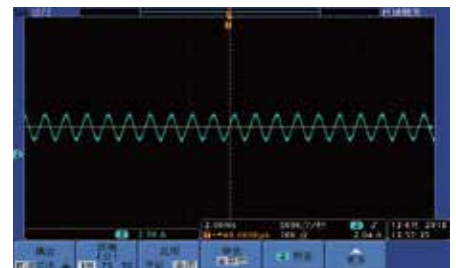
- (1) Simulate the sine wave full wave specific List step:



| Value | Delay (s) | Slope rate |
|-------|-----------|------------|
| 2 | 0.00001 | 5 |
| 2.17 | 0.0000275 | 5 |
| 2.34 | 0.0000275 | 5 |
| 2.5 | 0.0000275 | 5 |
| 2.64 | 0.0000275 | 5 |
| 2.77 | 0.0000275 | 5 |
| 2.87 | 0.0000275 | 5 |
| 2.94 | 0.0000275 | 5 |
| 2.98 | 0.0000275 | 5 |
| 3 | 0.0000275 | 5 |
| 2.98 | 0.0000275 | 5 |
| 2.94 | 0.0000275 | 5 |
| 2.94 | 0.0000275 | 5 |
| 2.87 | 0.0000275 | 5 |
| 2.77 | 0.0000275 | 5 |
| 2.64 | 0.0000275 | 5 |
| 2.5 | 0.0000275 | 5 |
| 2.34 | 0.0000275 | 5 |
| 2.17 | 0.0000275 | 5 |
| 2 | 0.0000275 | 5 |



500Hz

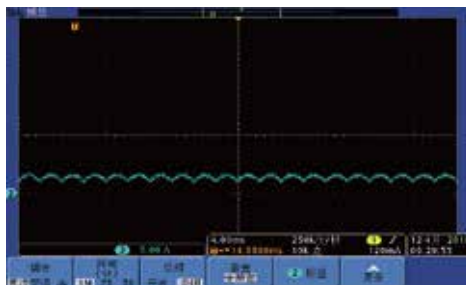


1000Hz

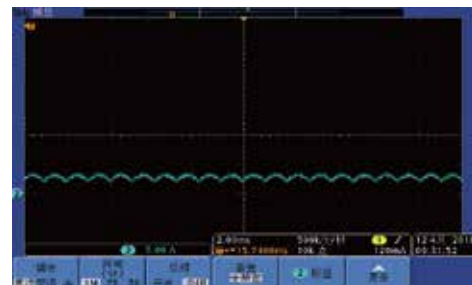
- (2) Simulate the sine wave half wave specific List step:

| Value | Delay | Slope rate |
|-------|----------|------------|
| 2 | 0.00001 | 5 |
| 2.17 | 0.000055 | 5 |
| 2.34 | 0.000055 | 5 |
| 2.5 | 0.000055 | 5 |
| 2.64 | 0.000055 | 5 |
| 2.77 | 0.000055 | 5 |
| 2.87 | 0.000055 | 5 |
| 2.94 | 0.000055 | 5 |
| 2.98 | 0.000055 | 5 |

| | | |
|------|----------|---|
| 3 | 0.000055 | 5 |
| 2.98 | 0.000055 | 5 |
| 2.94 | 0.000055 | 5 |
| 2.87 | 0.000055 | 5 |
| 2.77 | 0.000055 | 5 |
| 2.64 | 0.000055 | 5 |
| 2.5 | 0.000055 | 5 |
| 2.34 | 0.000055 | 5 |
| 2.17 | 0.000055 | 5 |
| 2 | 0.000055 | 5 |



500Hz



1000Hz

| AC/DC Fan Test

ITECH solution

IT7600 high performance programmable AC power source

Test requirement

DC mode output 13.5V, current is about 21A, after running for 3 minutes, add AC component 3V AC/50Hz, and then run for 10 minutes.

Test process

- (1) First output DC 13.5V, the fan rotates normally, see Figure 1
- (2) add 3Vrms AC, in AC+DC mode, the DC component is set to 13.5V, the AC component is set to 3V, the frequency is 50Hz, and the fan runs normally, as shown in Figure 2.



IT7624 (300V/12A/1500VA)



Figure 1 : DC output mode

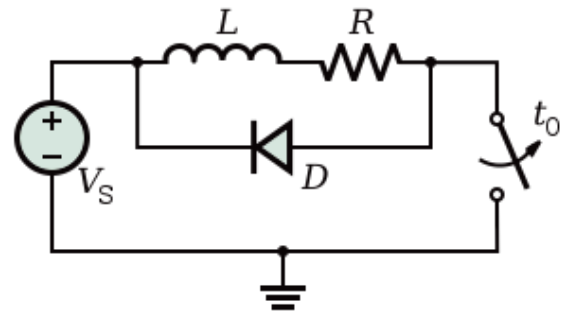


Figure 2 :AC+DC output mode

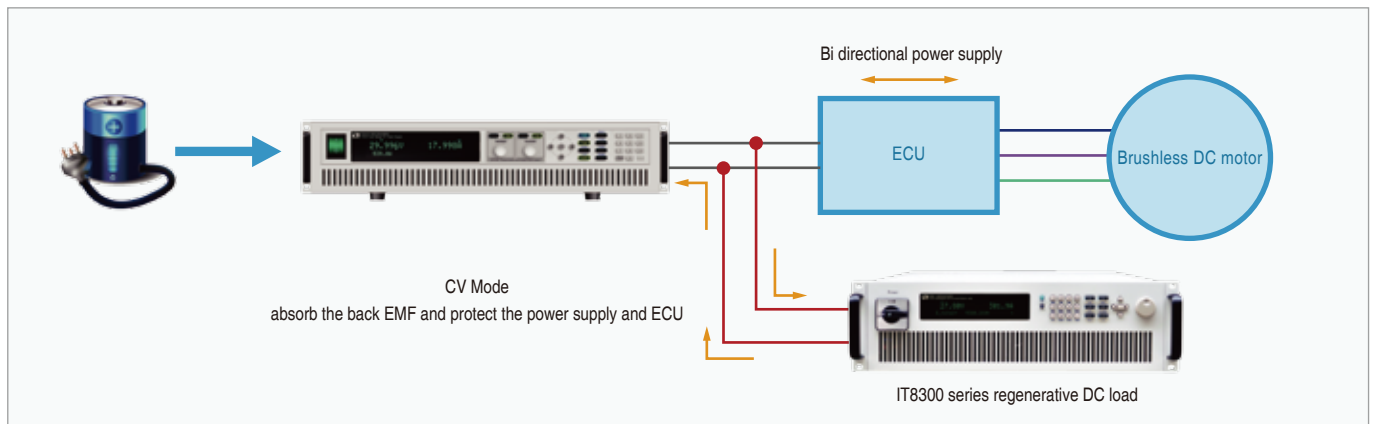
| Motor test : how to protect the power supply from Back EMF

Question: If a Motor back EMF is higher than 80V, will it damage the PSU of IT6500C-80V series?

Answer: There is a fly-wheel diode across the output terminal of PSU, which will release the back EMF. Normally the fly-wheel diode of IT6500C-80V can withstand 200A less than 10ms. If releasing current is 50A, then the duration time will be a little longer up to 50ms. Here we can depend on the formula “ $I^2 \cdot T$ ” to make evaluation under different releasing current level. Take 50A as example too, the relational expression is $[(200A)^2 \cdot 10] / [(50A)^2 \cdot 50] = 3.2$. This multiplying factor will keep the PSU working without damage when back EMF is applied.



Technical Point: “ fly-wheel diode “ is named for its role as a continuation current in a circuit. Fast recovery diode or Schottky diode are very popular for being used as fly-wheel diode, which will protect components to be broken from the energy by induced voltage. Fly-wheel diode is often connected in parallel with the parts that will generate induced voltage, so that the back EMF will be released via the diode and protect other components which is not allowed reversed current flow of the circuit.



typical motor test diagram



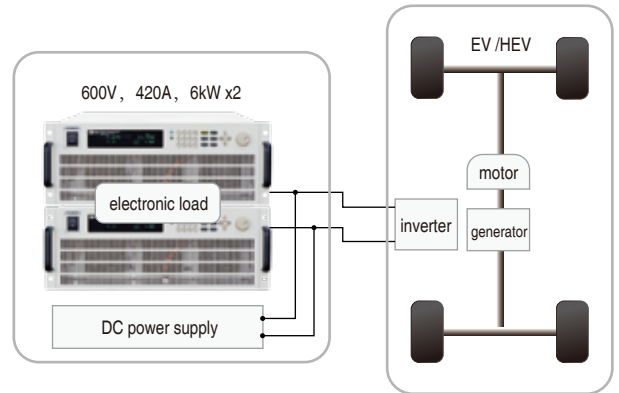
ITECH solution

- IT6500C+IT-E500 (or IT8800 DC load)

Application principle

IT6500C series DC power supply can be configured with IT-E500 power dissipater to achieve source and sink quick switch function. When working under source mode , IT6500C drives the motor; when the motor is locked , IT6500C will switch to sink mode and absorb the back EMF so as to protect the power supply and motor.

IT6500C series is with advanced control loop design and combined control of sourcing and sinking. Built in internal load 150W is available to realize sink power capacity for each 3kW module.

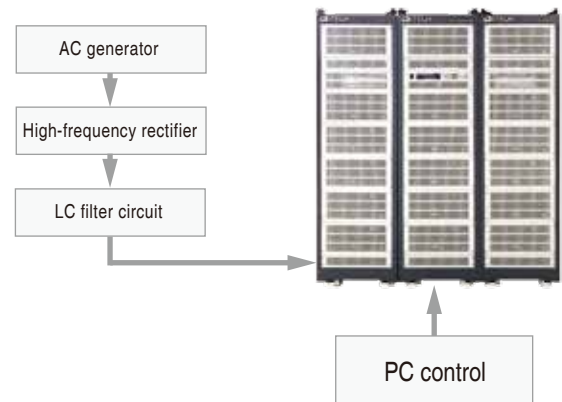


Test diagram

| Military torpedo/rocket -AC generator test

Test application

The AC generator program-controlled output three-phase or five-phase AC power, through the high-frequency rectifier , change into one phase pulsating DC power, after the LC filter circuit, it is filtered into a smooth DC power and applied to the electronic load terminal for testing.



ITECH solution

- IT8900A/E series high performance high power DC electronic load

ITECH advantages

Built-in LAN, USB, RS232, GPIB, CAN, external analog control interface Master/slave paralleling control, maximum power expands to 600kW.

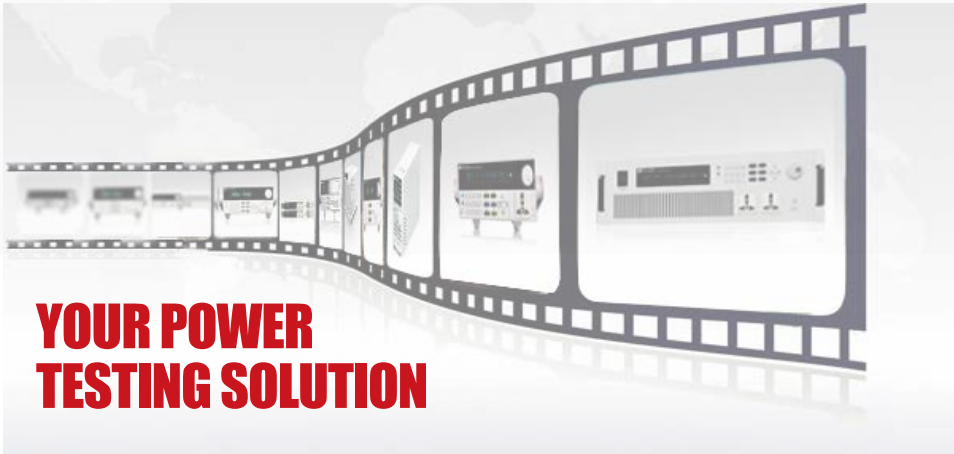
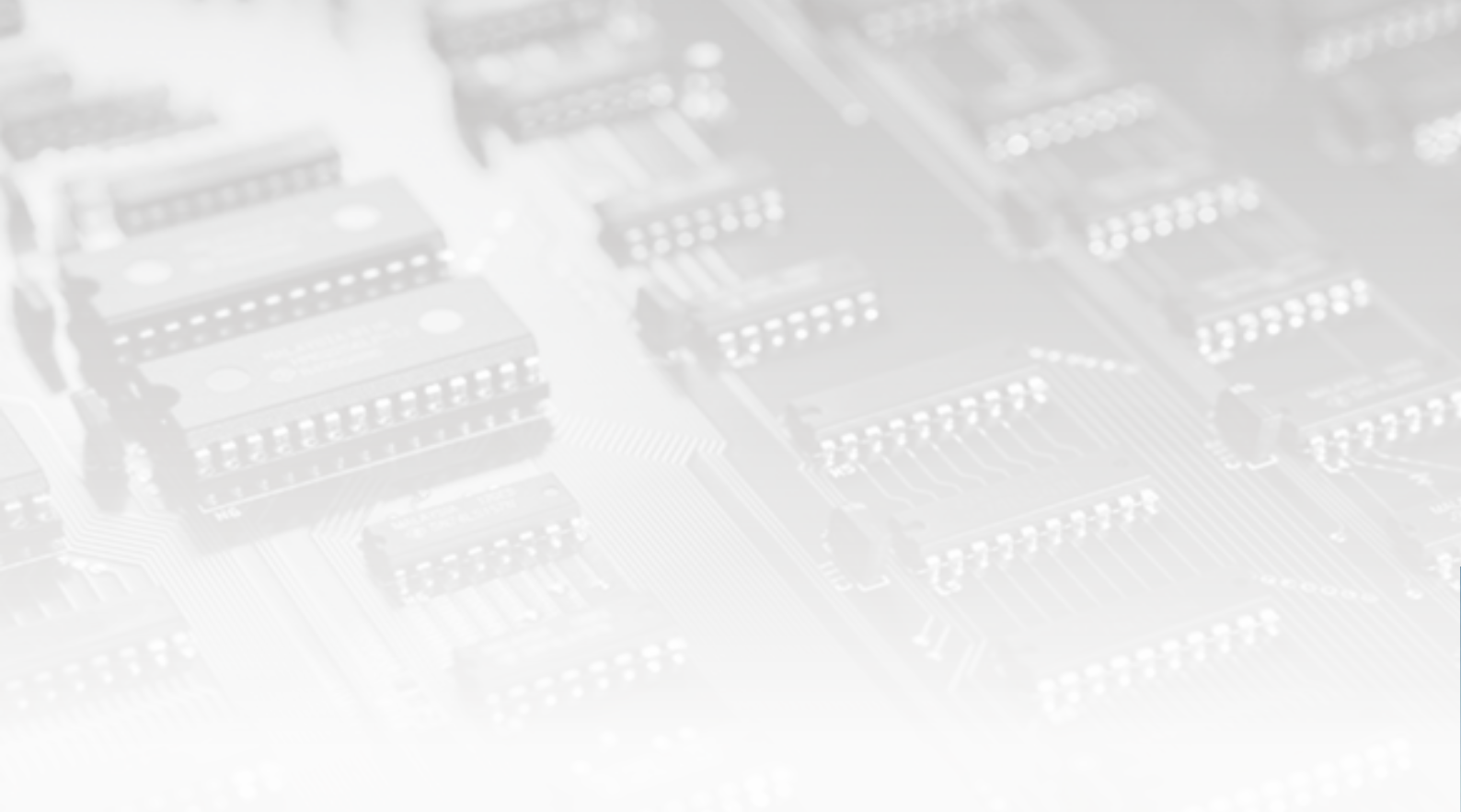


IT8906A-1200-240 (1200V/240A/6kW)



Remark:

11 sets of 54kW IT8900A/E cabinet paralleled and communicate with PC via GPIB, 37U high



This information is subject to change without notice. For more information, please contact ITECH.

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