GJB181B-2012 Aircraft Power Supply Characteristics Standard
DC 28V, 270V Test Solutions

Hangyu Power System (Shanghai) Co., Ltd.

AC&DC Power Source

HY-GJBSU Series GJB Test Power Supply

HY-GJBSU Series GJB Test Power Supply

Product Features

- HY-GJBSU series is a special test power supply for GJB,suitable for GJB 181B-2012, 28V、270Vaircraft power supply characteristics standard test
- Arbitrary waveforms can be generated and sequential control can be set.The "Linear amplification way" is used to achieve the functional advantages of low ripple, low noise and high speed response
- Output broadband：10Hz~10kHz/20kHz/50kHz/100kHz (CV mode)
- Output voltage: 0-1000V
- Output current: 0-500A
- Output power: 200W~10kW
- Low ripple/Low noise
- Support front panel programming without computer software programming
- 7-inch ultra large LCD display screen
- Touch screen operation & digital key input & multi-stage adjustment knob

Introduction to the GJB181

GJB 181 is the military aircraft standard of our country (The power supply characteristics and requirements of electrical equipment are specified), the standard refers to the US MIL-STD-704.This standard applies to the coordination between aircraft power supply systems, external sources and equipment.Currently GJB181 has been updated to GJB181B-2012 version,It is not only the updated version of the top-level standard of the aircraft power supply system, but also the interface standard of the power supply system and electrical equipment, involving all aspects of the aircraft electrical system.

Meet The Standard

- GJB181A-2003
- GJB181B-2012
- MIL-STD-704F
- HB20326
- GJB572A-2006
- RTCA DO-160 (Chapter 16 Power Input Characteristic Test)

Power Supply Test Type

- DC voltage 28VDC test
- DC high voltage 270VDC test
- Single-phase 115VAC/400Hz test
- Three-phase 115VAC/400Hz test
- Single-phase 115VAC/360~800Hz frequency conversion test
- Three-phase 115VAC/360~800Hz frequency conversion test
- Single-phase 220VAC/50Hz test

Product Selection Table

HY-GJBSU Series Product Model Selection And Parameters

Special specifications outside the scope of the selection table are accepted for customization.

1kW Series Power Supply Model Selection

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 30-34	30V	34A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 40-25	40V	25A	
HY-GJBSU 60-17	60V	17A	
HY-GJBSU 80-12.5	80V	12.5A	
HY-GJBSU 100-10	100V	10A	
HY-GJBSU 150-6.7	150V	6.7A	
HY-GJBSU 200-5	200V	5A	
HY-GJBSU 250-4	250V	4A	

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 300-3.4	300V	3.4A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 350-3	350V	3A	
HY-GJBSU 400-2.5	400V	2.5A	
HY-GJBSU 500-2	500V	2A	
HY-GJBSU 600-1.7	600V	1.7A	
HY-GJBSU 800-1.3	800V	1.3A	
HY-GJBSU 1000-1	1000V	1A	

1.6kW Series Power Supply Model Selection

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 30-54	30V	54A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 40-40	40V	40A	
HY-GJBSU 60-26.7	60V	26.7A	
HY-GJBSU 80-20	80V	20A	
HY-GJBSU 100-16	100V	16A	
HY-GJBSU 150-10.7	150V	10.7A	
HY-GJBSU 200-8	200V	8A	
HY-GJBSU 250-6.4	250V	6.4A	

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 300-5.4	300V	5.4A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 350-4.6	350V	4.6A	
HY-GJBSU 400-4	400V	4A	
HY-GJBSU 500-3.2	500V	3.2A	
HY-GJBSU 600-2.7	600V	2.7A	
HY-GJBSU 800-2	800V	2A	
HY-GJBSU 1000-1.6	1000V	1.6A	

2.5kW Series Power Supply Model Selection

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 30-84	30V	84A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 40-62.5	40V	62.5A	
HY-GJBSU 60-41.7	60V	41.7A	
HY-GJBSU 80-32	80V	32A	
HY-GJBSU 100-25	100V	25A	
HY-GJBSU 150-16.7	150V	16.7A	
HY-GJBSU 200-12.5	200V	12.5A	
HY-GJBSU 250-10	250V	10A	

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 300-8.4	300V	8.4A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 350-7.2	350V	7.2A	
HY-GJBSU 400-6.3	400V	6.3A	
HY-GJBSU 500-5	500V	5A	
HY-GJBSU 600-4.2	600V	4.2A	
HY-GJBSU 800-3.2	800V	3.2A	
HY-GJBSU 1000-2.5	1000V	2.5A	

Product Selection Table

3.6kW Series Power Supply Model Selection

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 30-120	30V	120A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 40-90	40V	90A	
HY-GJBSU 60-60	60V	60A	
HY-GJBSU 80-45	80V	45A	
HY-GJBSU 100-36	100V	36A	
HY-GJBSU 150-24	150V	24A	
HY-GJBSU 200-18	200V	18A	
HY-GJBSU 250-14.4	250V	14.4A	

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 300-12	300V	12A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 350-10.3	350V	10.3A	
HY-GJBSU 400-9	400V	9A	
HY-GJBSU 500-7.2	500V	7.2A	
HY-GJBSU 600-6	600V	6A	
HY-GJBSU 800-4.5	800V	4.5A	
HY-GJBSU 1000-3.6	1000V	3.6A	

5kW Series Power Supply Model Selection

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 30-170	30V	170A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 40-125	40V	125A	
HY-GJBSU 60-85	60V	85A	
HY-GJBSU 80-62.5	80V	62.5A	
HY-GJBSU 100-50	100V	50A	
HY-GJBSU 150-34	150V	34A	
HY-GJBSU 200-25	200V	25A	
HY-GJBSU 250-20	250V	20A	

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 300-17	300V	17A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 350-14.3	350V	14.3A	
HY-GJBSU 400-12.5	400V	12.5A	
HY-GJBSU 500-10	500V	10A	
HY-GJBSU 600-8.5	600V	8.5A	
HY-GJBSU 800-6.3	800V	6.3A	
HY-GJBSU 1000-5	1000V	5A	

10kW Series Power Supply Model Selection

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 30-334	30V	334A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 40-250	40V	250A	
HY-GJBSU 60-167	60V	167A	
HY-GJBSU 80-125	80V	125A	
HY-GJBSU 100-100	100V	100A	
HY-GJBSU 150-67	150V	67A	

Models	Output Voltage	Output Current	Output Frequency
HY-GJBSU 200-50	200V	50A	10Hz~10kHz 10Hz~20kHz 10Hz~50kHz 10Hz~100kHz
HY-GJBSU 250-40	250V	40A	
HY-GJBSU 300-33.5	300V	33.5A	
HY-GJBSU 350-28.6	350V	28.6A	
HY-GJBSU 400-25	400V	25A	
HY-GJBSU 500-20	500V	20A	
HY-GJBSU 600-16.7	600V	16.7A	
HY-GJBSU 800-12.5	800V	12.5A	
HY-GJBSU 1000-10	1000V	10A	

This power supply test item: GJB 181B-2012 aircraft power supply characteristics: 28V, 270V power supply system standard requirements

GJB 181B-2012 Table 4 DC normal operating characteristics				
Normal operating characteristic		28V DC system	270V DC system	Satisfy or not
Steady-state characteristic	Steady-state voltage	22.0V~29.0V	250.0V~280.0V	Satisfy
	Distortion coefficient	0.035 Max	0.015 Max	Satisfy
	Distortion frequency	Figure 13	Figure 16	Satisfy
	Pulsation amplitude	1.5V Max	6.0V Max	Satisfy
Transient characteristics	Transient of voltage	Figure 12	Figure 15	Satisfy

HB 20326.8-2016 The airborne electric equipment of power supply adaptability test method Part 8: DC 28V

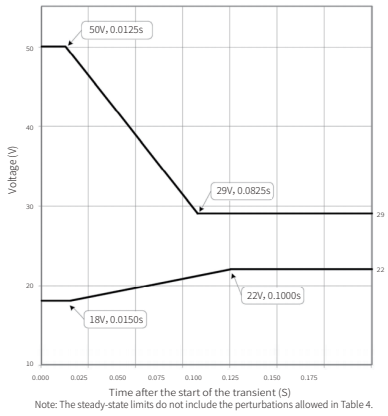
Serial number	Aircraft power supply system working status	Test item number	Test item name	Satisfy or not	Introduction page number
1	Normal	LDC101	Load characteristic	Satisfy	6
		LDC102	Normal steady-state voltage	Satisfy	7
		LDC103	Voltage distortion spectrum	Satisfy	7
		LDC104	Pulsation	Satisfy	9
		LDC105	Normal voltage transient	Satisfy	10
2	Convert	LDC201	Power supply conversion interruption	Satisfy	13
3	Abnormal	LDC301	Abnormal steady-state voltage	Satisfy	14
		LDC302	Abnormal voltage transient	Satisfy	15
4	Emergency response	LDC401	Emergency normal voltage	Satisfy	18
5	Start the engine electrically	LDC501	Starting voltage transient	Satisfy	19
6	Power supply failure	LDC601	Outage	Satisfy	20
		LDC602	Reverse polarity	Satisfy	21

HB 20326.7-2016 The airborne electric equipment of power supply adaptability test method Part 7: DC 270V

Serial number	Aircraft power supply system working status	Test item number	Test item name	Satisfy or not	Introduction page number
1	Normal	HDC101	Load characteristic	Satisfy	22
		HDC102	Normal steady-state voltage	Satisfy	23
		HDC103	Voltage distortion spectrum	Satisfy	23
		HDC104	Pulsation	Satisfy	25
		HDC105	Normal voltage transient	Satisfy	26
2	Convert	HDC201	Power supply conversion interruption	Satisfy	29
3	Abnormal	HDC301	Abnormal steady-state voltage	Satisfy	30
		HDC302	Abnormal voltage transient	Satisfy	31
4	Emergency response	HDC401	Emergency normal voltage	Satisfy	34
5	Start the engine electrically	HDC501	Starting voltage transient	Satisfy	35
6	Power supply failure	HDC601	Outage	Satisfy	36
		HDC602	Reverse polarity	Satisfy	37

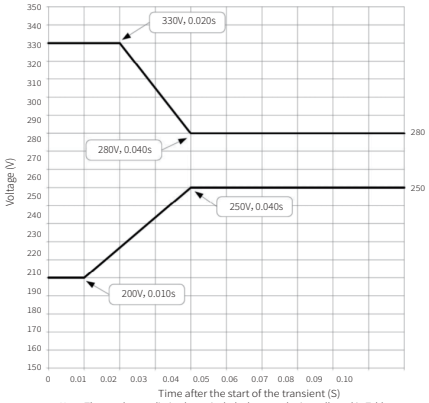
Test Project Waveform Diagram

GJB 181B-2012 Figure 12 28V DC normal transient voltage envelope



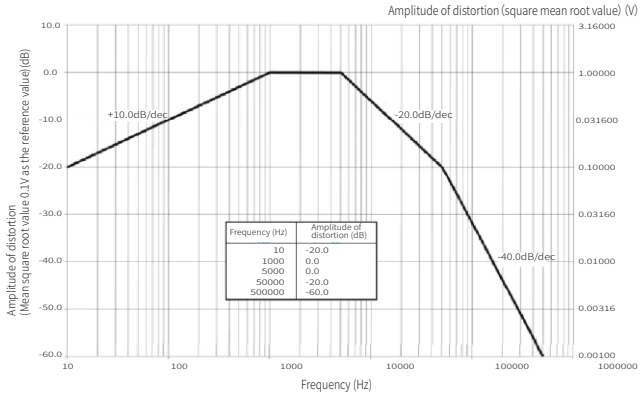
Note: The steady-state limits do not include the perturbations allowed in Table 4.

GJB 181B-2012 Figure 15 270V DC normal transient voltage envelope

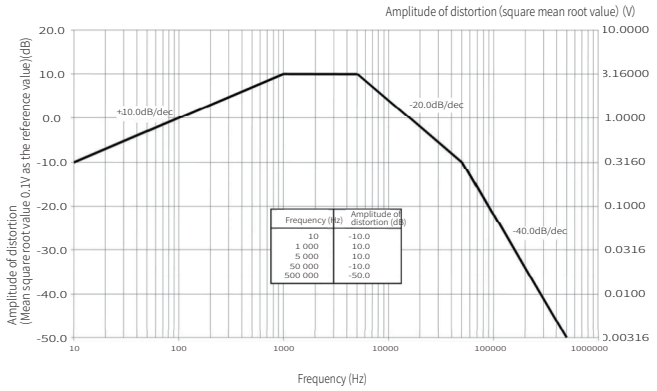


Note: The steady-state limits do not include the perturbations allowed in Table 4.

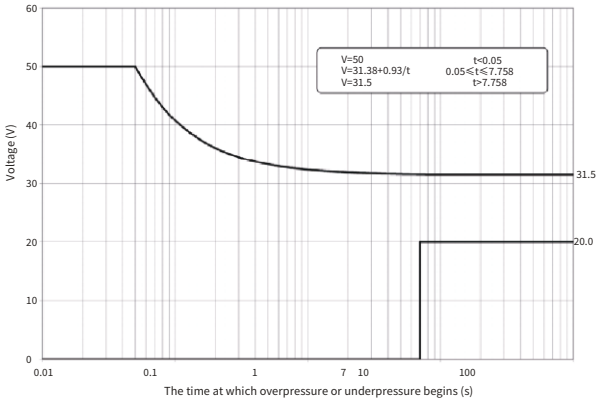
GJB 181B-2012 Figure 13 Maximum distortion spectrum of 28V DC voltage



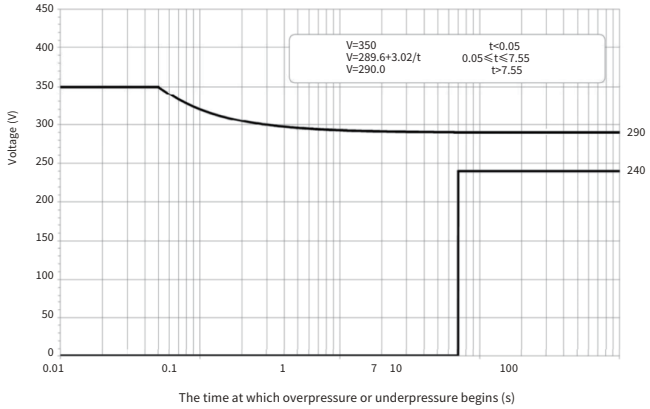
GJB 181B-2012 Figure 16 Maximum distortion spectrum of 270V DC voltage



GJB 181B-2012 Figure 14, 28 V DC abnormal working voltage limit



GJB 181B-2012 Figure 17, 270 V DC abnormal working voltage limit



1.1、LDC101 Load characteristic

This test is used to verify whether the load characteristics of the DC 28V electrical equipment comply with the provisions of GJB181B-2012 and the special specification for electrical equipment.
The eligibility criteria are as follows:

Parameter	Load characteristic requirement	Corresponding to GJB181B-2012 chapter article number
Impulse current	Unless otherwise specified, for electrical equipment with power greater than 200W, the peak impact current should not be greater than 5 times the rated current, and return to the rated current at 0.1s	5.4.9
Power tolerance	Not more than 10% of the rated input power	5.4.3
Current distortion	All electrical equipment should not introduce current aberrations large enough to affect other equipment	5.4.8
Current spectrum	—	—
Current modulation	The current modulation caused by it should be minimized, and the current modulation should not cause the relevant power supply characteristic parameters of the electrical equipment to exceed the provisions of this standard	5.4.7
Note: The special specification for electrical equipment may also specify other requirements to reduce the possible adverse effects of electrical equipment on the power supply characteristics of the aircraft, such as current distortion and distortion spectrum limit, current modulation, etc.		

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure LDC101-1. Turn on the power supply and adjust the voltage to the rated value of 28V. According to the provisions of the special code for electrical equipment, the test is carried out as follows:

a、Impulse current:

Turn on the switch K, control the contactor on, suddenly add 28V (step) to the UUT, record the power-on impulse current.Then the performance test of UUT is carried out according to the performance test procedure of electrical equipment to verify that the UUT can provide its performance specified in the normal state of power supply, and the impact current test is effective.The impulse current is compared with the specified value of the special specification for electrical equipment and GJB181B-2012 to determine whether it meets the requirements.

b、Input power

Supply power to UUT, perform performance test on UUT according to the performance test procedure of electrical equipment,Verify that the UUT can provide the performance specified in the normal state of power supply, record the steady-state current and voltage; Calculate the input power,And compared with the rated value in the special specification for electrical equipment, to determine whether the power tolerance meets the requirements of GJB181B-2012.

c、Current distortion

Supply power to UUT, perform performance test on UUT according to the performance test procedure of electrical equipment,Verify that the UUT can provide its specified performance under normal power supply condition, record the current distortion coefficient,And compared with the specified value of the special specification for electrical equipment to determine whether the current distortion meets the requirements.

d、Current distortion spectrum

Supply power to UUT, perform performance test on UUT according to the performance test procedure of electrical equipment,Verify that the UUT can provide its specified performance under normal power supply condition, Record the current distortion spectrum (current amplitude/frequency),And compared with the rating in the special specification for electrical equipment to determine whether the current distortion spectrum meets the requirements.

e、Current modulation

Supply power to UUT, perform performance test on UUT according to the performance test procedure of electrical equipment,Verify that the UUT can provide its specified performance under normal power supply condition, The current modulation is recorded and compared with the rating in the special specification for electrical equipment to determine whether the current modulation meets the requirements.

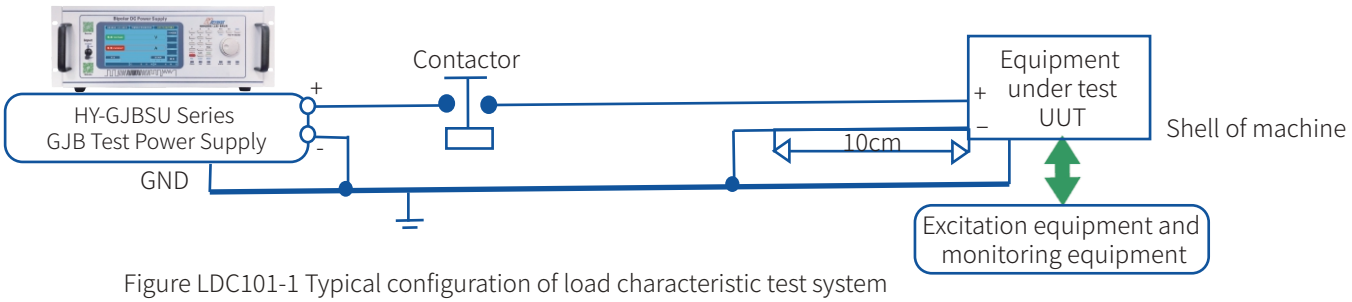


Figure LDC101-1 Typical configuration of load characteristic test system

1.2、LDC102 Normal Steady-State Voltage

This test is used to verify that when the power supply voltage of the DC 28V electrical equipment is within the normal steady-state range specified in GJB181B-2012,Whether it can work properly and maintain the prescribed performance.

The eligibility criteria are as follows:

Table LDC102-1 Normal steady-state voltage limits		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Lower Limit of Normal Steady State Voltage (NLSS)voltage	22V	Table 4
Upper normal steady state voltage (NHSS) voltage	29V	

Test method

Preexperimental detection

Disconnect the power supply,refer to Figure LDC102-1 to install the UUT and HY-GJBSU Series GJB Test Power Supply.

Turn on the power supply and adjust the voltage to the rated 28V, supply power to the UUT, and perform a performance test on the UUT to verify that the UUT can provide the performance specified in normal condition.

Test procedure

Test condition	Voltage (V)	Duration (min)
A	22V	30
B	29V	30

According to the test conditions A and B in the above table, the power supply voltage is modulated respectively to supply power to the UUT.In each test condition, power off the UUT and then power it on again to check whether the UUT can be restarted.After restart, the UUT is tested according to the performance test procedure of electrical equipment to check whether the UUT can provide the performance specified in the normal state of power supply;The duration is not less than 30min to verify that the UUT can continuously work normally at the normal steady-state voltage limit.

The voltage, duration, whether it could be successfully restarted and the performance results of UUT were recorded under each test condition.

The above tests were repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated 28V, the UUT is supplied, and the UUT is tested for performance to confirm that the UUT is not damaged and can provide its specified performance in the normal state of power supply.

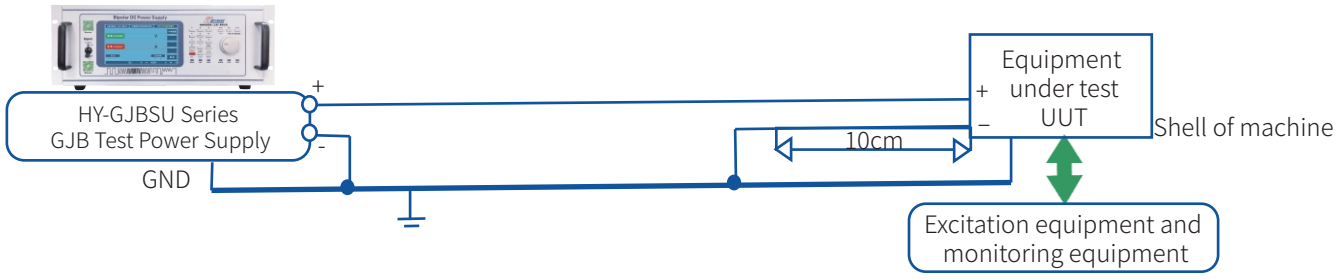


Figure LDC102-1 Typical configuration of normal steady-state voltage test system

1.3、LDC103 Voltage distortion spectrum

This test is used to verify that when the supply voltage of the DC 28V electrical equipment appears the frequency and amplitude specified in the GJB181B-2012 voltage distortion spectrum,whether it can work properly and maintain its specified performance.

The eligibility criteria are as follows:

Table LDC103-1 Spectrum Limit Of Voltage Distortion				
Parameter	Requirement (Typical value)			Corresponding to GJB181B-2012 chapter article number
	Distorted spectrum (Hz)	Amplitude of distortion		
		dBV	V	
Voltage distortion spectrum	10	-20.00	0.100	Figure 13
	1000	0.00	1.000	
	5000	0.00	1.000	
	50000	-20.00	0.100	
	500000	-60.00	0.001	

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure LDC103-1.Turn on the power supply and adjust the voltage to the rated value of 28V to supply power to the UUT.The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Adjust the sine wave output of the HY-GJBSU Series GJB Test Power Supply and set it to the recorded value corresponding to each test condition in the calibration program; Set the HY-GJB series GJB test power supply to output an average DC voltage of 28V under test condition A listed in Table LDC103-2, and superimpose an AC sine component with a rate change of 10Hz. The amplitude of the AC voltage is 0.316V root mean square value,and supply power to the UUT:For test condition B, HY-GJBSU Series GJB Test Power Supply is set so that its output average value is 28V DC voltage, and it is superimposed with AC sinusoidal component changing at the rate of 25Hz, and the amplitude of AC voltage was 0.158V square root mean square; Set the frequency and amplitude of voltage .

Under each test condition, the performance test of the UUT is carried out according to the performance test procedure of the electrical equipment to check whether the UUT can provide the performance specified in the normal state of power supply; The duration is not less than 5min to verify that the UUT can continue to work normally under voltage distortion. After the test of one test condition is completed, while slowly increasing the frequency of the superimposed AC component and adjusting the amplitude, the frequency and amplitude of the voltage distortion are observed, Be careful not to exceed the limit of the voltage distortion spectrum until the next test condition is reached.

The same tests were carried out for test conditions A to K in Table LDC103-2.

The voltage, frequency of voltage distortion, amplitude of voltage distortion, duration of distortion and performance results of UUT under each test condition were recorded. The test data recording table was shown in Figure LDC103-3. The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, disconnect the power supply.Turn on the power supply and adjust the voltage to the rated value of 28V, no more superimposed voltage distortion, power supply to UUT;perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

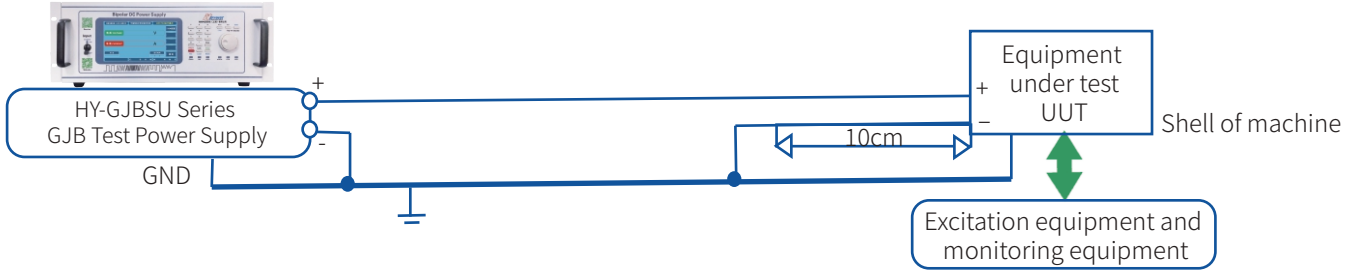


Figure LDC103-1 Typical configuration of voltage distortion spectrum test system 1

Table LDC103-2 Voltage distortion spectrum test conditions			
Test condition	Distorted spectrum (Hz)	Amplitude of distortion (Square mean root value) (V)	Duration of time (min)
A	10	0.100	5
B	25	0.158	5
C	50	0.223	5
D	60	0.245	5
E	250	0.500	5
F	1k	1.000	5
G	1.7k	1.000	5
H	2k	1.000	5
I	5k	1.000	5
J	6.5k	0.769	5
K	10k	0.500	5
Note: Considering the influence of the distortion spectrum and the operability of the test method, the distortion spectrum in this test method is only set to 10kHz.			

1.4、LDC104 Pulsation

This test is used to verify that when the supply voltage of the DC 28V electrical equipment is pulsating as specified in GJB181B-2012,whether it can work properly and maintain the prescribed performance.

The eligibility criteria are as follows

Table LDC104-1 Voltage pulsation limit		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Voltage pulsation	Max 1.5V	Table 4

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure LDC104-1.Turn on the power supply and adjust the voltage to the rated value of 28V, the power supply does not output the pulsating component, and supply power to the UUT: Perform the performance test of the UUT to verify that the UUT can provide its specified performance in the normal state of power supply.

Test procedure

Turn on the power supply, set the power supply at the recorded value corresponding to test condition A in the calibration program, adjust the voltage to the rated value 28V, superimpose the set pulsation component, and supply power to the UUT. Perform the performance test on the UUT according to the performance test program of electrical equipment to check whether the UUT can provide the performance specified in the normal power supply state: The duration is not less than 30min to verify that the UUT can continuously work normally under voltage fluctuations.

The above tests were repeated according to test condition B in Table LDC104-2.

Data such as voltage, pulsation spectrum, distortion factor, duration and UUT performance results are recorded for each test condition.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, set the power supply to produce no pulsating voltage and adjust the voltage to the rated 28V to supply power to the UUT: Perform a performance test on the UT to confirm that the UUT is not damaged and can provide its specified performance in the normal state of supply.

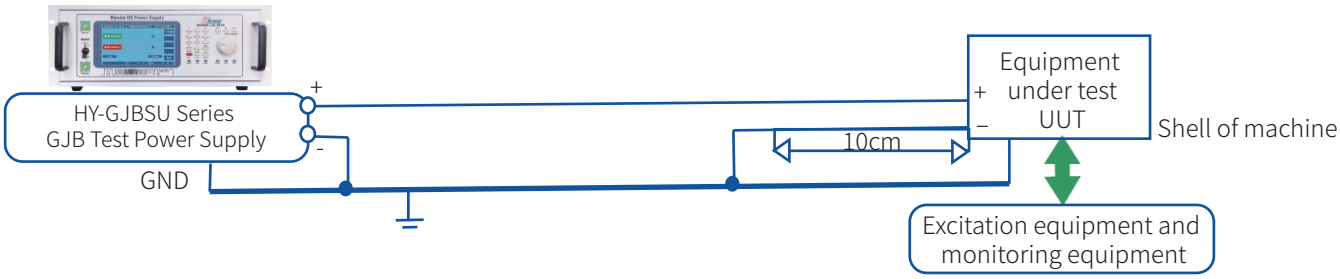


Figure LDC104-1 Typical configuration of pulsation test system

Table LDC104-2 Pulsation test condition			
Test condition	Pulsating frequency component (Hz)	Amplitude of component (Square mean root value) (V)	Duration of time(min)
A	1200	0.80	30
	2400	0.16	
	3600	0.26	
	4800	0.08	
	6000	0.13	
	7200	0.04	
	8400	0.06	
B	2400	0.80	30
	4800	0.16	
	7200	0.26	
	9600	0.08	
	12000	0.13	
	14400	0.04	
	16800	0.06	

1.5、LDC105 Normal voltage transient

This test is used to verify that when the power supply voltage of 28V DC electrical equipment is normal voltage transient specified in GJB181B-2012,whether it can work properly and maintain the prescribed performance.

The eligibility criteria are as follows:

Table LDC105-1 Normal voltage transient limit				
Parameter		Requirements (Typical value)		Corresponding to GJB181B-2012 chapter article number
		Transient voltage (V)	Transient voltage duration (S)	
Normal voltage transient	Upper limit	50	0.0125	Figure 12
		29	0.0825	
	Lower limit	18	0.0150	
		22	0.1000	

28V Test Item

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure LDC105-1.Turn on the power supply and adjust the voltage to the rated value of 28V to supply power to the UUT;the performance of the UUT is tested to verify that the UUT can provide the performance specified in its normal state of power supply.

Normal voltage transient test procedure

Table LDC105-2 lists the voltage transients that the UUT is subject to under test conditions A~R.Within 1ms, the voltage should increase or decrease from the steady-state voltage to the transient voltage shown in Table LDC105-2.The duration of the transient voltage is shown in Table LDC105-2, after which the voltage should return to the steady state value according to the recovery time listed in the table.For the test conditions E and J, the 50V overvoltage transient duration is 10ms, each interval is 0.5s, three times.For the test conditions M and P, the 18V undervoltage transient duration is 10ms, each interval is 0.5s, and three times.For test conditions Q and R, the 18V undervoltage transient has a duration of 10ms, followed by the 50V overvoltage transient with a duration of 12.5ms, and then the voltage returns to the steady-state value.For each test condition, during each voltage transient and after the voltage returns to the normal steady-state range, the performance test of the UUT is carried out according to the performance test procedure of the electrical equipment to check whether the UUT can provide and maintain the performance specified in the normal state of power supply.

Each test condition was repeated 5 times.

Record the voltage, transient voltage, transient voltage duration, voltage transient (oscilloscope waveform) and UUT performance results under each test condition. See Figure LDC105-2 for the test data recording table.

The test was repeated in various operating modes of UUT.

Repetitive transient test procedure

The power supply provides a continuous repeatable voltage transient, with the UUT input voltage dropping linearly from 28.5V to 18V in 2.5ms, then increasing linearly to 45V in 30ms, and then decreasing linearly to 28.5V in 2.5ms.This voltage transient is repeated every 0.5s, as shown in Figure LDC105-3.Perform the performance test of UUT according to the performance test procedure of electrical equipment to check whether the UUT can provide and maintain the specified performance in the normal state of power supply;The duration is not less than 30min to verify that the UUT can operate continuously and normally when subjected to repetitive voltage transients.

Data such as voltage, voltage transient (oscilloscope waveform), transient voltage duration and UUT performance results are recorded.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the voltage is adjusted to the rated value of 28V to supply power to the UUT; Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

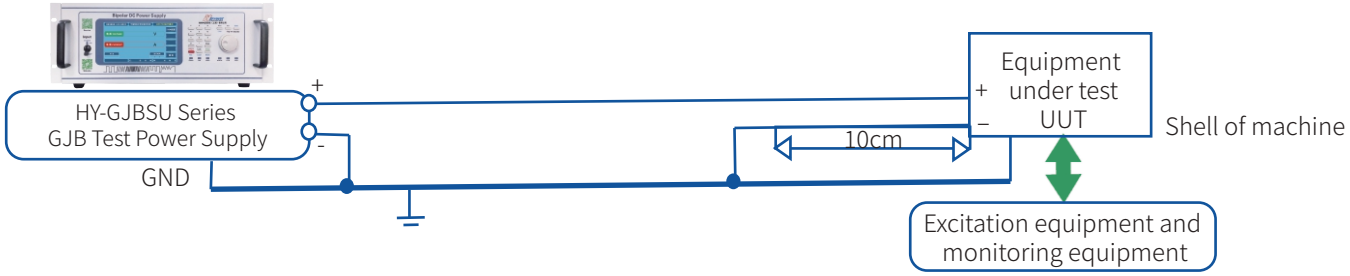
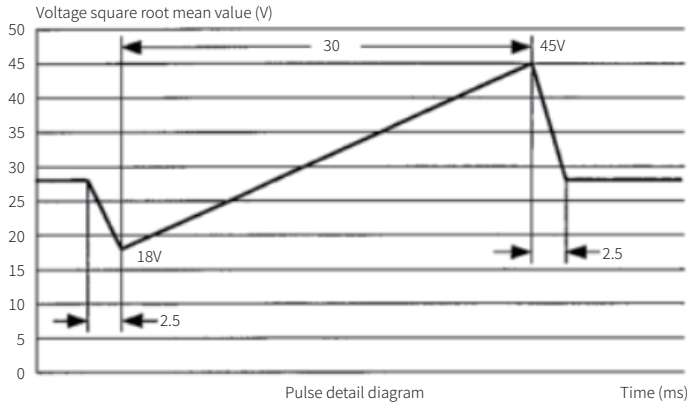


Figure LDC105-1 Typical configuration of normal voltage transient test system



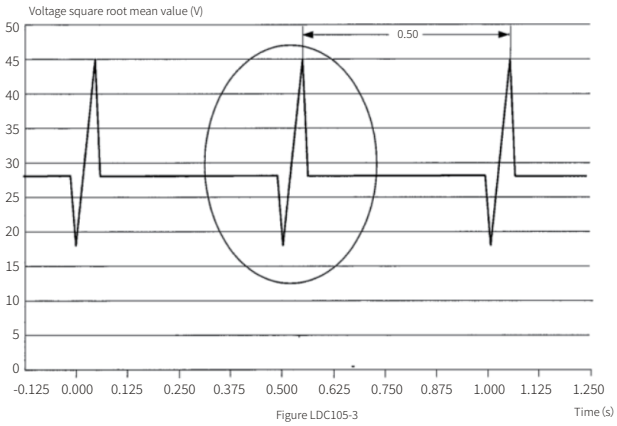


Figure LDC105-3

Table LDC105-2 Normal voltage transient test conditions					
Test condition	Steady-state voltage (V)	Time from steady-state voltage to transient voltage (ms)	Transient voltage (V)	Transient voltage duration (ms)	The time from the transient voltage to the steady state voltage or the next transient voltage
Overvoltage transients					
A	29	<1	50	12.5	<1
B	29	<1	50	12.5	70
C	29	<1	40	45	<1
D	29	<1	40	45	37.5
E	29	<1	50 (3 times)	10 (Each interval is 0.5s)	<1
F	22	<1	50	12.5	<1
G	22	<1	50	12.5	93
H	22	<1	40	45	<1
I	22	<1	40	45	60
J	22	<1	50 (3 times)	10 (Each interval is 0.5s)	<1
Under-voltage transients					
K	29	<1	18	15	<1
L	29	<1	18	15	234
M	29	<1	18 (3 times)	10 (Each interval is 0.5s)	<1
N	22	<1	18	15	<1
O	22	<1	18	15	85
P	22	<1	18 (3 times)	10 (Each interval is 0.5s)	<1
Mixed transient					
Q	After 29	<1 <1	18 50	10 12.5	<1 70
R	After 22	<1 <1	18 50	10 12.5	<1 93
Repeated transient					
S	28.5	<2.5 <30	18 45	—[a] —[b]	— <2.5
a: Voltage gradually increases b: Voltage gradually decreases					

1.6、LDC201 Interruption of power supply conversion

This test is used to verify that when the power supply voltage of the DC 28V electrical equipment is interrupted by the power supply conversion specified in GJB181B-2012,whether it can function properly and maintain its prescribed performance.

The eligibility criteria are as follows:

Table LDC201-1 Interruption limit of power supply conversion

Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Duration of power supply interruption	50ms	5.1
Lower limit of Normal steady State Voltage(NLSS) voltage	22V	Table 4
Upper normal steady state voltage (NHSS) voltage	29V	

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply supply according to Figure LDC201-1.Turn on the power and adjust the voltage to the rated value of 28V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Adjust the voltage setting according to the test conditions A~K in Table LDC201-2, and perform a power supply conversion interruption (0V) according to the duration listed in Table LDC201-2. The UUT input voltage should drop from the steady state value to 0V within 0.25ms, the duration is shown in Table LDC201-2, and then the voltage should return from 0V to the steady state value within 0.25ms.For test condition J, three 50ms power supply interruption tests should be carried out, with each interval of 0.5s.For test condition K, there is a 50V continuous 12.5ms after power supply interruption.The normal overvoltage transient test is then returned to the steady-state value within 70ms.For test condition L, there is a 18V continuous 15ms after power supply interruption. The normal overvoltage transient test is then returned to the steady-state value within 85ms.For each test condition, the performance test of the UUT is carried out according to the performance test procedure of the electrical equipment to check whether the UUT can provide the performance specified in the power supply conversion state:After the power supply is restored to the normal steady-state range, the UUT performance is tested again to verify that the UUT can provide its specified performance in the normal state of power supply。

Each test condition was repeated five times.

Data such as the steady-state voltage, the duration of the supply interruption and the performance results of the UUT were recorded for each test condition.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 28V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

Table LDC201-2 Interruption limit of power supply conversion

Test condition	Voltage (V)	Duration of time (ms)
A	28V	50
B	22V	50
C	29V	50
D	28V	30
E	22V	30
F	29V	30
G	28V	10
H	22V	10
I	29V	10
J	28V	50 (Perform three times, each interval of 0.5s)
K	28V	50 (This is followed by a normal overvoltage transient of 50V, lasting 12.5ms, and then returning to the steady state value within 70ms)
L	28V	50 (This is followed by a normal undervoltage transient of 18V, lasting 15ms, and then returning to the steady state value within 85ms)

1.7、LDC301 Abnormal steady-state voltage

This test is used to verify that when the power supply voltage of the DC 28V electrical equipment appears the abnormal steady-state voltage limit specified in GJB181B-2012,whether it can function properly and maintain its prescribed performance.

The eligibility criteria are as follows:

Table LDC301-1 Abnormal steady state voltage limit		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Abnormal stable voltage lower limit (ALSS) voltage	20.0V	Figure 14
Abnormal stable voltage upper limit (AHSS) voltage	31.5V	

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure LDC301-1.Turn on the power and adjust the voltage to the rated value of 28V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Adjust the power supply voltage according to test conditions A and B in Table LDC301-2 respectively to supply power to the UUT.Under each test condition, power off the UUT and power it on again to check whether the UUT can be restarted. After restart, perform performance test on the UUT according to the performance test procedure of the electrical equipment to check whether the UUT can provide the performance specified in the abnormal state of power supply, with a duration of not less than 30min.Adjust the power supply voltage to the rated value of 28V, perform the performance test of the UUT according to the performance test procedure of the electrical equipment,to confirm that the UUT can automatically restore its performance specified in the normal state of power supply and is not damaged.

Data such as voltage, duration, whether the restart is successful and UUT performance results were recorded for each test condition.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 28V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

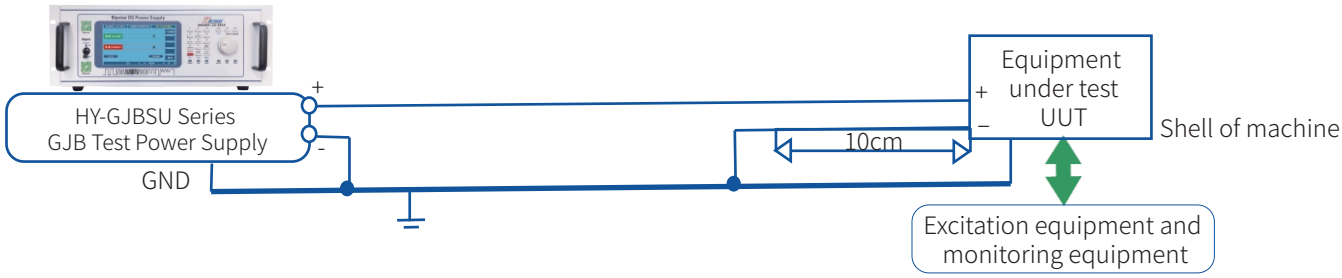


Figure LDC301-1 Abnormal steady-state voltage test conditions

Table LDC301-2 Abnormal steady-state voltage test conditions	
Test condition	Voltage (V)
A	20.0V
B	31.5V

1.8、LDC302 Abnormal voltage transient

This test is used to verify that when the power supply voltage of 28V DC electrical equipment appears abnormal stable voltage transient specified in GJB181B-2012,whether it can function properly and maintain its prescribed performance.

The eligibility criteria are as follows:

Table LDC302-1 Transient limit of abnormal voltage

Parameter		Requirement (Typical value)		Corresponding to GJB181B-2012 chapter article number
		Transient voltage (V)	Transient voltage duration (S)	
Abnormal voltage transient	Overvoltage	50	<0.05	Figure 14
		31.38+0.931/t	0.05~7.758	
		31.5	>7.758	
	Undervoltage	0	7	—

Note: The undervoltage limit curve (0V, 7s) in FIG. 14 of GJB 181B-2012 is an extreme case of abnormal voltage transient of the aircraft power supply system, that is, power supply failure, and should not be used as a qualified criterion for this test project.

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure LDC302-1.Turn on the power and adjust the voltage to the rated value of 28V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Table LDC302-2 specifies the voltage that the UUT should withstand under each test condition A~N The transient input voltage should rise or fall from the steady-state voltage to the transient voltage within 1ms, its duration is shown in LDC302-2, and then the voltage returns to the steady-state value according to the time listed in the table.

For test conditions C and F, the 50V overvoltage transient duration is 50ms, each interval is 0.5s, three times.For test conditions I and L, the duration of 7V undervoltage transients is 50ms, each interval is 0.5s. Do it three times.For test conditions M and N, a 7V undervoltage transient with a duration of 10ms is immediately followed by a 50V overvoltage transient with a duration of 50ms, and finally the voltage returns to the steady state value.For each test condition, during the voltage transient period, the performance of the UUT was monitored according to the electrical equipment performance test procedure to check whether the UUT could provide its specified performance in the abnormal state of power supply.Each test condition was repeated 5 times. After the power supply is restored to the normal steady-state range, the UUT is tested to verify that the UUT can automatically restore its performance as specified in the normal state of power supply.

Record the steady-state voltage, transient voltage, transient voltage duration, voltage transient (oscilloscope waveform) and UUT performance results under each test condition.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 28V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

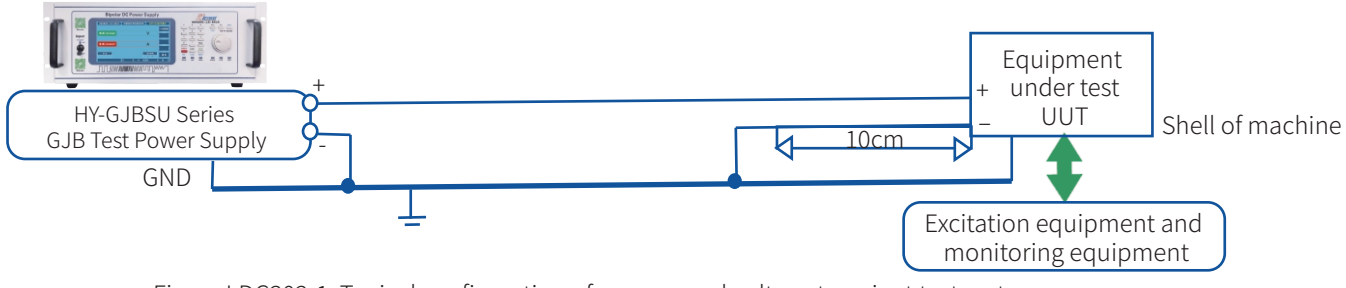


Figure LDC302-1 Typical configuration of non-normal voltage transient test system

Table LDC302-2 Abnormal voltage transient test conditions					
Test condition	Steady-state voltage (V)	Time from steady-state voltage to transient voltage (ms)	Transient voltage (V)	Transient voltage duration (ms)	The time from the transient voltage to the steady state voltage or the next transient voltage
Overvoltage transients					
A	29	<1	50	50	<1ms
B	29	<1	50	50	18ms
		—	45	—[a]	40ms
		—	40	—[a]	149ms
		—	35	—[a]	4.743s
		—	30	—[a]	1s
		—	29	—	—
C	29	<1	50 (3 times)	50 (Each interval is 0.5s)	<1ms
D	22	<1	50	50	<1ms
E	22	<1	50	50	18ms
		—	45	—[a]	40ms
		—	40	—[a]	149ms
		—	35	—[a]	4.743s
		—	30	—[a]	8s
		—	22	—	—
F	22	<1	50 (3 times)	50 (Each interval is 0.5s)	<1ms
Under-voltage transients					
G	29	<1	7	50	<1ms
H	29	<1	7	50	18ms
		—	12	—[b]	40ms
		—	17	—[b]	149ms
		—	22	—[b]	4.743s
		—	28	—[b]	1s
		—	29	—	—

28V Test Item

Table LDC302-2 Abnormal voltage transient test conditions					
Test condition	Steady-state voltage (V)	Time from steady-state voltage to transient voltage (ms)	Transient voltage (V)	Transient voltage duration (ms)	The time from the transient voltage to the steady state voltage or the next transient voltage
Undervoltage transient					
I	29	<1	7 (3 times)	50 (Each interval is 0.5s)	<1ms
J	22	<1	7	50	<1ms
K	22	<1	7	50	18ms
		—	12	—[b]	40ms
		—	17	—[b]	149ms
		—	22	—	—
L	22	<1	7 (3 times)	50 (Each interval is 0.5s)	<1ms
Mixed transient					
M	29	<1 <1	7 50	10 50	<1ms 18ms
		—	45	—[a]	40ms
		—	40	—[a]	149ms
		—	35	—[a]	4.743s
		—	30	—[a]	1s
		—	29	—	—
N	22	<1 <1	7 50	10 50	<1ms 18ms
		—	45	—[a]	40ms
		—	40	—[a]	149ms
		—	35	—[a]	4.743s
		—	30	—[a]	8s
		—	22	—	—
a: Voltage gradually decreases b: Voltage gradually increases					

1.9、LDC401 Emergency steady-state voltage

This test is used to verify that when the supply voltage of the DC 28V electrical equipment appears the emergency steady-state voltage limit specified in GJB181B-2012,whether it can function properly and maintain its prescribed performance.

The eligibility criteria are as follows:

Table LDC401-1 Emergency steady-state voltage and frequency limits		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Emergency steady State Voltage Lower limit (ELSS) voltage	18V	5.3.2.3
Emergency stable voltage Upper limit (EHSS) voltage	29V	

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure LDC401-1.Turn on the power and adjust the voltage to the rated value of 28V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Adjust the power supply voltage according to the test conditions A and B in Table LDC401-2 respectively to supply power to the UUT.Under each test condition, power off the UUT and then power it on again to check whether the UUT can be restarted.After restart, perform performance test on the UUT according to the performance test procedure of the electrical equipment to check whether the UUT can provide the performance specified in the emergency power supply state: the duration is not less than 30min, so as to verify that the UUT can continuously work normally under the emergency steady-state voltage limit.

Adjust the power supply voltage to the rated value of 28V, perform the performance test of the UUT according to the performance test procedure of the electrical equipment,to confirm that the UUT can automatically restore its performance specified in the normal state of power supply and is not damaged.

Data such as voltage, duration, whether the restart is successful and UUT performance results were recorded for each test condition.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 28V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

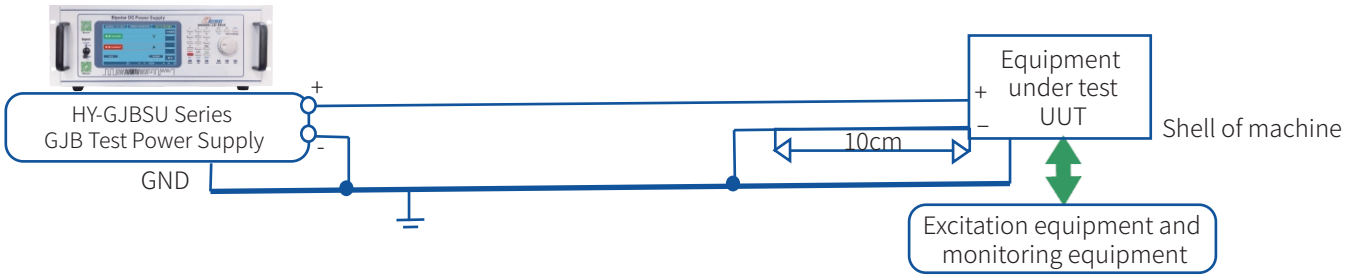


Figure LDC401-1 Typical configuration of emergency steady-state voltage test system

Table LDC401-2 Emergency steady-state voltage test conditions		
Test condition	Voltage (V)	Duration of time (min)
A	18V	30
B	29V	30

2.0、LDC501 Starting voltage transient

This test is used to verify that when the supply voltage of DC 28V electrical equipment is the starting voltage transient specified in GJB181B-2012,whether it can work properly and maintain the prescribed performance.

The eligibility criteria are as follows:

Table LDC501-1 Transient limit of starting voltage		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Starting voltage transient	12V~29V	5.3.2.4

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure LDC501-1.Turn on the power and adjust the voltage to the rated value of 28V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

The UUT shall withstand the starting voltage transients specified in Table LDC501-2, in which the input voltage decreases from the steady-state value to 12V within 1ms and then increases to the steady-state value at a constant rate within 30s.During each start-up voltage transient, the performance of the UUT was tested according to the electrical equipment performance test procedure to check whether the UUT could provide its specified performance in the electrical start-up state.Repeat five times.

Record steady-state voltage, transient voltage, recovery time, voltage transient (oscilloscope waveform) and UUT performance results.

After the power supply is restored to the normal steady state range, the UUT performance test is carried out to verify that the UUT can automatically restore its performance specified in the normal state of power supply.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 28V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

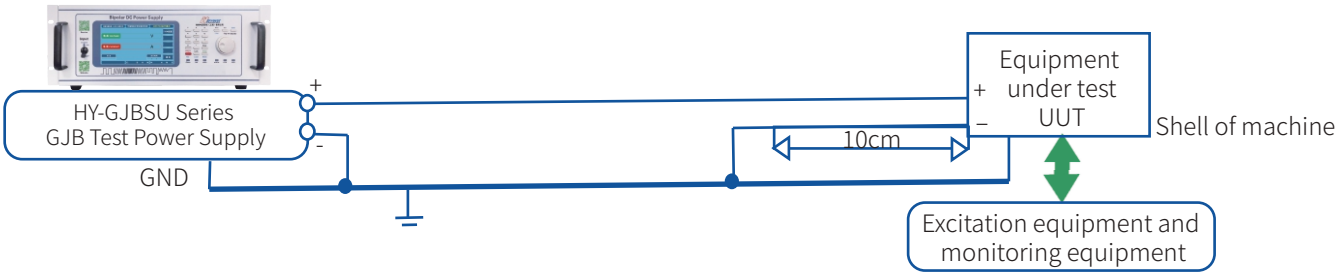


Figure LDC501-1 Typical configuration of starting voltage transient test system

Table LDC501-2 Starting voltage transient test conditions				
Test condition	Steady-state voltage (V)	Time from steady-state voltage to transient voltage (ms)	Transient voltage	The time from the transient voltage to the steady state voltage or the next transient voltage (ms)
A	29V	<1ms	12V	30s

2.1、LDC601 Power failure

This test is used to verify that when the power supply voltage of the DC 28V electrical equipment is cut off according to GJB181B-2012,whether it can work properly and maintain the prescribed performance.

The eligibility criteria are as follows：

Table LDC601-1 Power off limit		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Power failure	7s	Table 14

Test method

Pretest inspection

Disconnect the power supply and refer to Figure LDC601-1 to install the UUT and HY-GJBSU Series GJB Test Power Supply. Turn on the power and adjust the voltage to the rated value of 28V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

The blackout (0V) test was performed according to the duration listed in Table LDC601-2 for each test condition A to D. The UUT input voltage should drop from the steady state voltage to 0V within 0.25ms.The duration of holding 0V is shown in Table LDC601-2, and then the voltage returns from 0V to the steady state value at 0.25ms.For each test condition, the performance test of the UUT is carried out according to the performance test procedure of the electrical equipment to check whether the UUT can provide its specified performance in the condition of power supply failure.After the power supply is restored to the normal steady state range, the performance test of the UUT is carried out according to the performance test procedure of the electrical equipment.To verify that the UUT can automatically recover to its specified performance in the normal state of power supply and is not damaged.

Data such as voltage, outage duration and UUT performance results are recorded for each test condition.

Each test condition was repeated 5 times.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 28V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

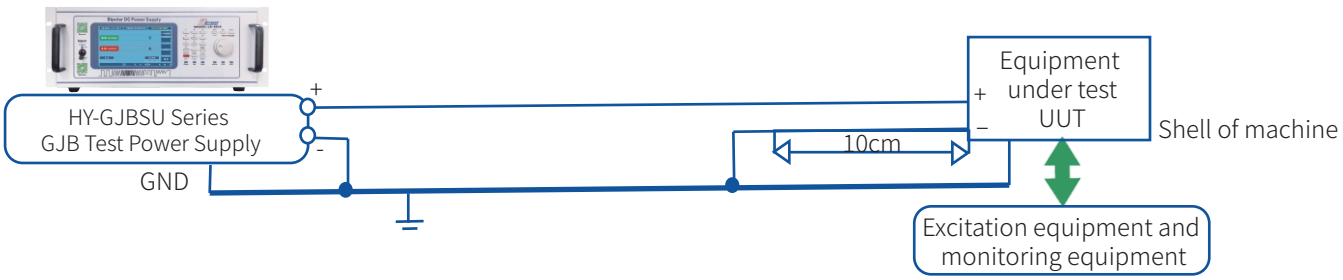


Figure LDC601-1 Typical configuration of power failure test system

Table LDC601-2 Power off test condition	
Test condition	Power outage duration
A	100ms
B	500ms
C	3s
D	7s

2.2、LDC602 Reverse polarity

This test is used to verify that the DC 28V electrical equipment will not be damaged when the supply voltage is reversed polarity, or take effective physical measures to prevent the occurrence of reverse polarity.

The eligibility criteria are as follows:

Table LDC602-1 Reverse polarity fault		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Reverse polarity fault	The DC equipment should not be damaged due to the reverse connection of positive and negative lines. To prevent input polarity or phase sequence reversal, this requirement can be achieved using proven physical methods.	5.4.6

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure LDC602-1.Turn on the power and adjust the voltage to the rated value of 28V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Consistency check

If effective physical measures have been taken to prevent the occurrence of reverse polarity, the effectiveness of such measures should be verified to confirm that positive and negative lines cannot be reversed.

If the positive and negative lines may be reversed or the measures taken are ineffective, the following tests are performed.

Test procedure

Disconnect the power supply and refer to Figure LDC602 1-2 (positive and negative polarity connection) to install the UUT, excitation equipment and monitoring equipment(When the test power supply can produce negative polarity output, still connect according to Figure LDC602-1, the test power supply can be set to negative voltage output).Turn on the power supply and adjust the voltage to the rated value of 28V to supply power to the UUT;When the power input is in reverse polarity state, keep the power supply for at least 30 minutes to verify that the UUT will not be damaged or cause unsafe state due to the power input wire connection.

Data such as steady-state voltage, reverse polarity duration and UUT performance results are recorded.

The above tests were repeated in various operating modes of UUT.

Post-test inspection

Disconnect the power supply and install the UUT, excitation equipment and monitoring equipment according to Figure LDC602-1(positive and negative lines are correctly connected).Turn on the power supply and adjust the voltage to the rated value of 28V,supply power to the UUT to ensure that the UUT has not been damaged or caused an unsafe condition due to the reverse polarity of the supply, maintain power supply at least 30mn:Perform performance tests on the UUT according to the electrical equipment performance test procedure to confirm that the UUT has recovered its performance as specified in the normal state of power supply and is not damaged.

Record steady-state voltage, duration of test conditions and UUT performance results. See Figure LDC602-3 for the test data records.

The above tests were repeated in various operating modes of UUT.

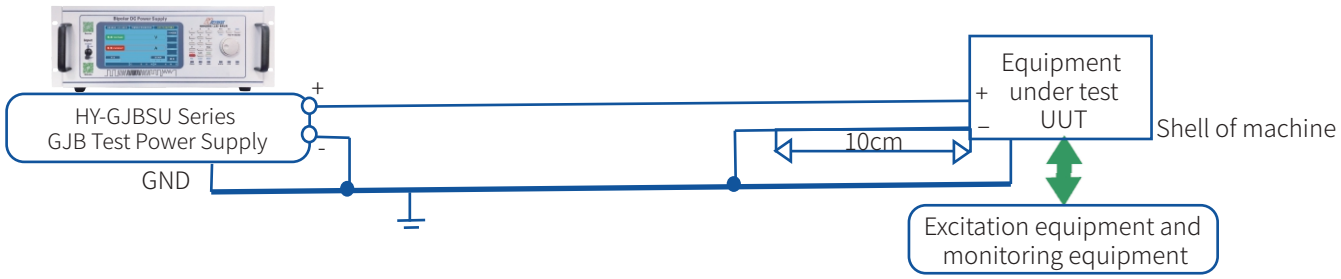


Figure LDC602-1 Typical configuration of polarity correct connection test system

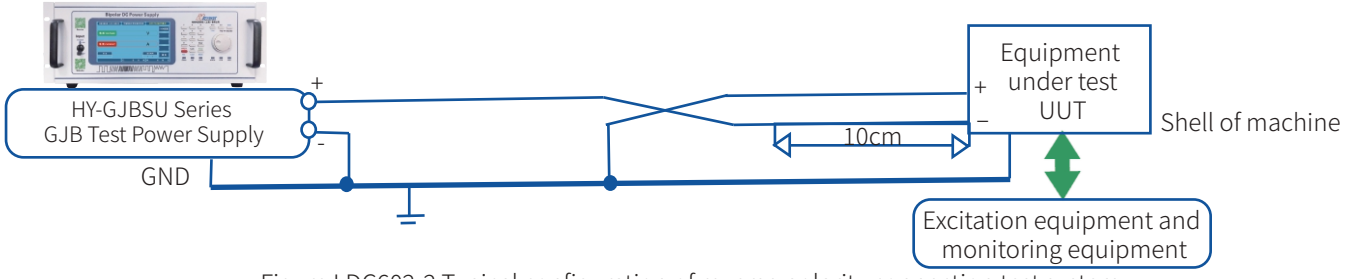


Figure LDC602-2 Typical configuration of reverse polarity connection test system

2.3、HDC101 Load characteristic

This test is used to verify whether the load characteristics of the DC 270V electrical equipment comply with the provisions of GJB181B-2012 and the special specification for electrical equipment.

The eligibility criteria are as follows:

Parameter	Load characteristic requirement	Corresponding to GJB181B-2012 chapter article number
Impulse current	Unless otherwise specified, for electrical equipment with power greater than 200W, the peak impact current should not be greater than 5 times the rated current, and return to the rated current at 0.1s	5.4.9
Power tolerance	Not more than 10% of the rated input power	5.4.3
Current distortion	All electrical equipment should not introduce current aberrations large enough to affect other equipment	5.4.8
Current spectrum	—	—
Current modulation	The current modulation caused by it should be minimized, and the current modulation should not cause the relevant power supply characteristic parameters of the electrical equipment to exceed the provisions of this standard	5.4.7
Note: The special specification for electrical equipment may also specify other requirements to reduce the possible adverse effects of electrical equipment on the power supply characteristics of the aircraft, such as current distortion and distortion spectrum limit, current modulation, etc.		

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure HDC101-1. Turn on the power supply and adjust the voltage to the rated value of 270V. According to the provisions of the special code for electrical equipment, the test is carried out as follows:

a、Impulse current:

Turn on the switch K, control the contactor on, suddenly add 270 V(step) to the UUT, record the power-on impulse current.Then the performance test of UUT is carried out according to the performance test procedure of electrical equipment to verify that the UUT can provide its performance specified in the normal state of power supply, and the impact current test is effective.The impulse current is compared with the specified value of the special specification for electrical equipment and GJB181B-2012 to determine whether it meets the requirements.

b、Input power

Supply power to UUT, perform performance test on UUT according to the performance test procedure of electrical equipment,Verify that the UUT can provide the performance specified in the normal state of power supply, record the steady-state current and voltage; Calculate the input power,And compared with the rated value in the special specification for electrical equipment, to determine whether the power tolerance meets the requirements of GJB181B-2012.

c、Current distortion

Supply power to UUT, perform performance test on UUT according to the performance test procedure of electrical equipment,Verify that the UUT can provide its specified performance under normal power supply condition, record the current distortion coefficient,And compared with the specified value of the special specification for electrical equipment to determine whether the current distortion meets the requirements.

d、Current distortion spectrum

Supply power to UUT, perform performance test on UUT according to the performance test procedure of electrical equipment,Verify that the UUT can provide its specified performance under normal power supply condition, Record the current distortion spectrum (current amplitude/frequency),And compared with the rating in the special specification for electrical equipment to determine whether the current distortion spectrum meets the requirements.

e、Current modulation

Supply power to UUT, perform performance test on UUT according to the performance test procedure of electrical equipment,Verify that the UUT can provide its specified performance under normal power supply condition, The current modulation is recorded and compared with the rating in the special specification for electrical equipment to determine whether the current modulation meets the requirements.

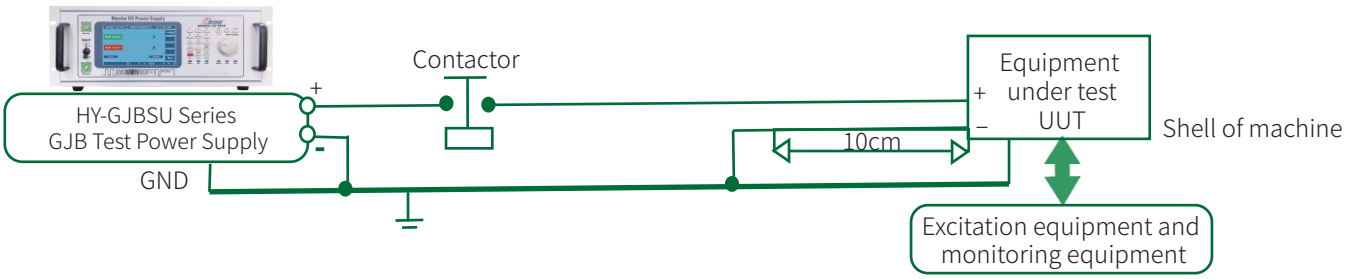


Figure HDC101-1 Typical configuration of load characteristic test system

2.4、HDC102 Normal Steady-State Voltage

This test is used to verify that when the power supply voltage of the DC 270V electrical equipment is within the normal steady-state range specified in GJB181B-2012,Whether it can work properly and maintain the prescribed performance.

The eligibility criteria are as follows:

Table HDC102-1 Normal steady-state voltage limits		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Lower Limit of Normal Steady State Voltage (NLSS)voltage	250V	Table 4
Upper normal steady state voltage (NHSS) voltage	280V	

Test method

Preexperimental detection

Disconnect the power supply,refer to Figure HDC102-1 to install the UUT and HY-GJBSU Series GJB Test Power Supply.

Turn on the power supply and adjust the voltage to the rated 270V, supply power to the UUT, and perform a performance test on the UUT to verify that the UUT can provide the performance specified in normal condition.

Test procedure

Test condition	Voltage (V)	Duration (min)
A	250V	30
B	280V	30

According to the test conditions A and B in the above table, the power supply voltage is modulated respectively to supply power to the UUT.In each test condition, power off the UUT and then power it on again to check whether the UUT can be restarted.After restart, the UUT is tested according to the performance test procedure of electrical equipment to check whether the UUT can provide the performance specified in the normal state of power supply;The duration is not less than 30min to verify that the UUT can continuously work normally at the normal steady-state voltage limit.

The voltage, duration, whether it could be successfully restarted and the performance results of UUT were recorded under each test condition.

The above tests were repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 270V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

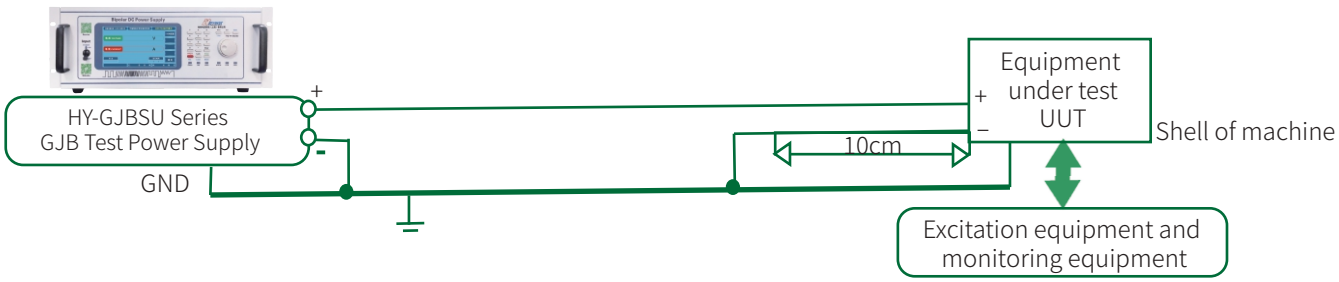


Figure HDC102-1 Typical configuration of normal steady-state voltage test system

2.5、HDC103 Voltage distortion spectrum

This test is used to verify that when the supply voltage of the DC 270V electrical equipment appears the frequency and amplitude specified in the GJB181B-2012 voltage distortion spectrum,whether it can work properly and maintain its specified performance.

The eligibility criteria are as follows:

Table HDC103-1 Spectrum Limit Of Voltage Distortion				
Parameter	Requirement (Typical value)			Corresponding to GJB181B-2012 chapter article number
	Distorted spectrum (Hz)	Amplitude of distortion		
		dBV	V	
Voltage distortion spectrum	10	-10.00	0.316	Figure 16
	1000	0.00	3.160	
	5000	0.00	3.160	
	50000	-10.00	0.316	
	500000	-50.00	0.003	

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure HDC103-1. Turn on the power supply and adjust the voltage to the rated value of 270V to supply power to the UUT.The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Adjust the sine wave output of the HY-GJBSU Series GJB Test Power Supply and set it to the recorded value corresponding to each test condition in the calibration program; Set the HY-GJB series GJB test power supply to output an average DC voltage of 270V under test condition A listed in Table HDC103-2, and superimpose an AC sine component with a rate change of 10Hz. The amplitude of the AC voltage is 0.316V root mean square value,and supply power to the UUT:For test condition B, HY-GJBSU Series GJB Test Power Supply is set so that its output average value is 270V DC voltage, and it is superimposed with AC sinusoidal component changing at the rate of 10Hz, and the amplitude of AC voltage was 0.316V square root mean square; Set the frequency and amplitude of voltage distortion specified in table HDC103-2 in turn.

Under each test condition, the performance test of the UUT is carried out according to the performance test procedure of the electrical equipment to check whether the UUT can provide the performance specified in the normal state of power supply; The duration is not less than 5min to verify that the UUT can continue to work normally under voltage distortion. After the test of one test condition is completed, while slowly increasing the frequency of the superimposed AC component and adjusting the amplitude, the frequency and amplitude of the voltage distortion are observed, Be careful not to exceed the limit of the voltage distortion spectrum until the next test condition is reached.

The same tests were carried out for test conditions A to K in Table HDC103-2.

The voltage, frequency of voltage distortion, amplitude of voltage distortion, duration of distortion and performance results of UUT under each test condition were recorded. The test data recording table was shown in Figure HDC103-3. The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, disconnect the power supply.Turn on the power supply and adjust the voltage to the rated value of 270V, no more superimposed voltage distortion, power supply to UUT;perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

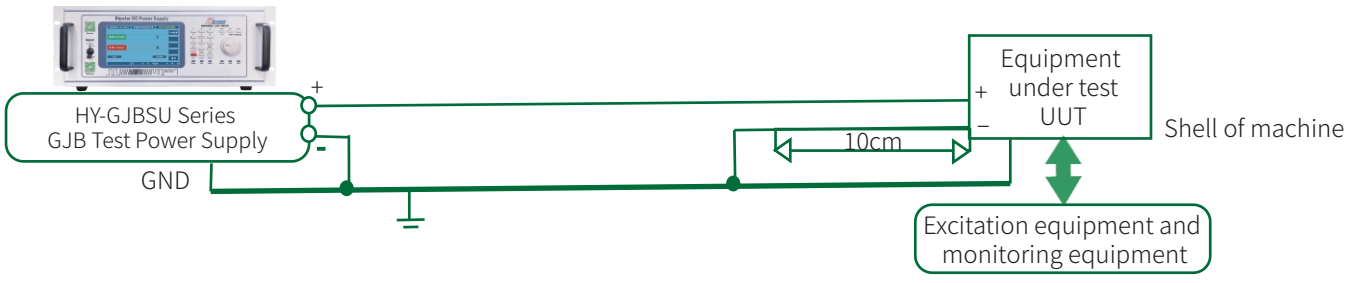


Figure HDC103-1 Typical configuration of voltage distortion spectrum test system 1

Table HDC103-2 Voltage distortion spectrum test conditions			
Test condition	Distorted spectrum (Hz)	Amplitude of distortion (Square mean root value) (V)	Duration of time (min)
A	10	0.316	5
B	25	0.500	5
C	50	0.707	5
D	60	0.775	5
E	250	1.581	5
F	1k	3.160	5
G	1.7k	3.160	5
H	2k	3.160	5
I	5k	3.160	5
J	6.5k	2.433	5
K	10k	1.581	5
Note: Considering the influence of the distortion spectrum and the operability of the test method, the distortion spectrum in this test method is only set to 10kHz.			

2.6、HDC104 Pulsation

This test is used to verify that when the supply voltage of the DC 270V electrical equipment is pulsating as specified in GJB181B-2012,whether it can work properly and maintain the prescribed performance.

The eligibility criteria are as follows:

Table HDC104-1 Voltage ripple limit		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Voltage pulsation	Max 6V	Table 4

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure HDC104-1.Turn on the power supply and adjust the voltage to the rated value of 270V, the power supply does not output the pulsating component, and supply power to the UUT: Perform the performance test of the UUT to verify that the UUT can provide its specified performance in the normal state of power supply.

Test procedure

Turn on the power supply, set the power supply at the recorded value corresponding to test condition A in the calibration program, adjust the voltage to the rated value 270V, superimpose the set pulsation component, and supply power to the UUT. Perform the performance test on the UUT according to the performance test program of electrical equipment to check whether the UUT can provide the performance specified in the normal power supply state: The duration is not less than 30min to verify that the UUT can continuously work normally under voltage fluctuations.

The above tests were repeated according to test condition B in Table HDC104-2.

Data such as voltage, pulsation spectrum, distortion factor, duration and UUT performance results are recorded for each test condition.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, set the power supply to produce no pulsating voltage and adjust the voltage to the rated 270V to supply power to the UUT: Perform a performance test on the UT to confirm that the UUT is not damaged and can provide its specified performance in the normal state of supply.

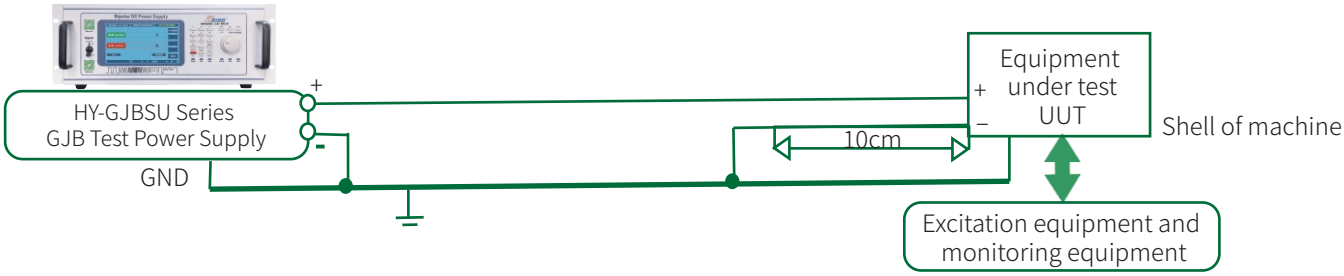


Figure HDC104-1 Typical configuration of pulsation test system

Table HDC104-2 Pulsation test condition			
Test condition	Distorted spectrum (Hz)	Amplitude of distortion (Square mean root value) (V)	Duration of time (min)
A	1200	3.16	30
	2400	0.96	
	3600	1.56	
	4800	0.48	
	6000	0.78	
	7200	0.24	
	8400	0.36	
B	2400	3.16	30
	4800	0.96	
	7200	1.56	
	9600	0.48	
	12000	0.78	
	14400	0.24	
	16800	0.36	

2.7、HDC105 Normal voltage transient

This test is used to verify that when the power supply voltage of 270V DC electrical equipment is normal voltage transient specified in GJB181B-2012,whether it can work properly and maintain the prescribed performance.

The eligibility criteria are as follows:

Parameter		Power supply conversion interruption limit requirements (Typical value)		Corresponding to GJB181B-2012 chapter article number
		Transient voltage (V)	Transient voltage duration (S)	
Current distortion spectrum	Upper limit	330	0.020	Figure 15
		280	0.040	
	Lower limit	200	0.010	
		250	0.040	

270V Test Item

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure HDC105-1. Turn on the power supply and adjust the voltage to the rated value of 270V to supply power to the UUT;the performance of the UUT is tested to verify that the UUT can provide the performance specified in its normal state of power supply.

Normal voltage transient test procedure

Table HDC105-2 lists the voltage transients that the UUT is subject to under test conditions A~R.Within 1ms, the voltage should increase or decrease from the steady-state voltage to the transient voltage shown in Table HDC105-2.The duration of the transient voltage is shown in Table HDC105-2, after which the voltage should return to the steady state value according to the recovery time listed in the table.For the test conditions E and J, the 330V overvoltage transient duration is 10ms, each interval is 05s, three times.For the test conditions M and P, the 200V undervoltage transient duration is 10ms, each interval is 0.5s, and three times.For test conditions Q and R, the 200V undervoltage transient has a duration of 10ms, followed by the 330V overvoltage transient with a duration of 12.5ms, and then the voltage returns to the steady-state value.For each test condition, during each voltage transient and after the voltage returns to the normal steady-state range, the performance test of the UUT is carried out according to the performance test procedure of the electrical equipment to check whether the UUT can provide and maintain the performance specified in the normal state of power supply.

Each test condition was repeated 5 times.

Record the voltage, transient voltage, transient voltage duration, voltage transient (oscilloscope waveform) and UUT performance results under each test condition. See Figure HDC105-2 for the test data recording table.

The test was repeated in various operating modes of UUT.

Repetitive transient test procedure

The power supply provides a continuous repeatable voltage transient, with the UUT input voltage dropping linearly from 270V to 215V in 2.5ms, then increasing linearly to 315V in 30ms, and then decreasing linearly to 270V in 2.5ms.This voltage transient is repeated every 0.5s, as shown in Figure HDC105-3.Perform the performance test of UUT according to the performance test procedure of electrical equipment to check whether the UUT can provide and maintain the specified performance in the normal state of power supply;The duration is not less than 30mn to verify that the UUT can operate continuously and normally when subjected to repetitive voltage transients.

Data such as voltage, voltage transient (oscilloscope waveform), transient voltage duration and UUT performance results are recorded.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 270V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

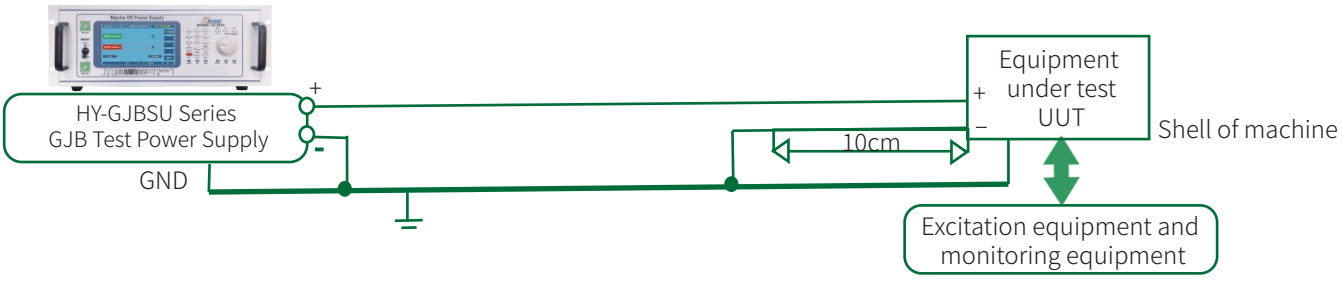
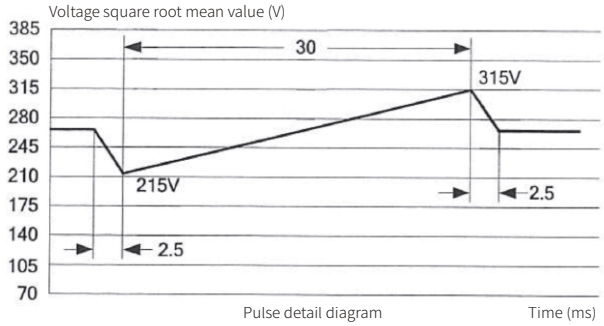


Figure HDC105-1 Typical configuration of normal voltage transient test system



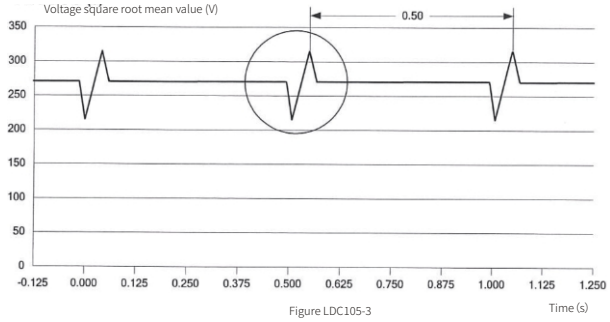


Figure LDC105-3

Table HDC105-2 Normal voltage transient test conditions					
Test condition	Steady-state voltage (V)	Time from steady-state voltage to transient voltage (ms)	Transient voltage (V)	Transient voltage duration (ms)	The time from the transient voltage to the steady state voltage or the next transient voltage
Overvoltage transients					
A	280	<1	330	20	<1
B	280	<1	330	20	20
C	280	<1	305	30	<1
D	280	<1	305	30	10
E	280	<1	330 (3 times)	10 (Each interval is 0.5s)	<1
F	250	<1	330	20	<1
G	250	<1	330	20	32
H	250	<1	305	30	<1
I	250	<1	305	30	22
J	250	<1	330 (3 times)	10 (Each interval is 0.5s)	<1
Under-voltage transients					
K	280	<1	200	10	<1
L	280	<1	200	10	48
M	280	<1	200 (3 times)	10 (Each interval is 0.5s)	<1
N	250	<1	200	10	<1
O	250	<1	200	10	30
P	250	<1	200 (3 times)	10 (Each interval is 0.5s)	<1
Mixed transient					
Q	After 280	<1 <1	200 330	10 20	<1 20
R	After 250	<1 <1	200 330	10 20	<1 32
Repeated transient					
S	270	<2.5 <30	215 315	—[a] —[b]	— <2.5
a: Voltage gradually increases b: Voltage gradually decreases					

2.8、HDC201 Interruption of power supply conversion

This test is used to verify that when the power supply voltage of the DC 270V electrical equipment is interrupted by the power supply conversion specified in GJB181B-2012,whether it can function properly and maintain its prescribed performance.

The eligibility criteria are as follows:

Table HDC201-1 Interruption limit of power supply conversion

Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Duration of power supply interruption	50ms	5.1
Lower limit of Normal steady State Voltage(NLSS) voltage	250V	Table 4
Upper normal steady state voltage (NHSS) voltage	280V	

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure HDC201-1.Turn on the power and adjust the voltage to the rated value of 270V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Adjust the voltage setting according to the test conditions A~K in Table HDC201-2, and perform a power supply conversion interruption (0V) according to the duration listed in Table HDC201-2. The UUT input voltage should drop from the steady state value to 0V within 0.25ms, the duration is shown in Table HDC201-2, and then the voltage should return from 0V to the steady state value within 0.25ms.For test condition J, three 50ms power supply interruption tests should be carried out, with each interval of 0.5s.For test condition K, there is a 330V continuous 20ms after power supply interruption.The normal overvoltage transient test is then returned to the steady-state value within 20ms.For test condition L, there is a 200V continuous 10ms after power supply interruption. The normal overvoltage transient test is then returned to the steady-state value within 30ms.For each test condition, the performance test of the UUT is carried out according to the performance test procedure of the electrical equipment to check whether the UUT can provide the performance specified in the power supply conversion state:After the power supply is restored to the normal steady-state range, the UUT performance is tested again to verify that the UUT can provide its specified performance in the normal state of power supply。

Each test condition was repeated five times.

Data such as the steady-state voltage, the duration of the supply interruption and the performance results of the UUT were recorded for each test condition.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 270V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

Table HDC201-2 Interruption limit of power supply conversion

Test condition	Voltage (V)	Duration of time (ms)
A	270V	50
B	250V	50
C	280V	50
D	270V	30
E	250V	30
F	280V	30
G	270V	10
H	250V	10
I	280V	10
J	270V	50 (Perform three times, each interval of 0.5s)
K	270V	50 (This is followed by a normal overvoltage transient of 330V, lasting 20ms, and then returning to the steady state value within 20ms)
L	270V	50 (This is followed by a normal overvoltage transient of 200V, lasting 10ms, and then returning to the steady state value within 30ms)

2.9、HDC301 Abnormal steady-state voltage

This test is used to verify that when the power supply voltage of the DC 270V electrical equipment appears the abnormal steady-state voltage limit specified in GJB181B-2012,whether it can function properly and maintain its prescribed performance.

The eligibility criteria are as follows:

Table HDC301-1 Abnormal steady state voltage limit		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Abnormal stable voltage lower limit (ALSS) voltage	240V	Figure 17
Abnormal stable voltage upper limit (AHSS) voltage	290V	

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure HDC301-1.Turn on the power and adjust the voltage to the rated value of 270V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Adjust the power supply voltage according to test conditions A and B in Table HDC301-2 respectively to supply power to the UUT.Under each test condition, power off the UUT and power it on again to check whether the UUT can be restarted. After restart, perform performance test on the UUT according to the performance test procedure of the electrical equipment to check whether the UUT can provide the performance specified in the abnormal state of power supply, with a duration of not less than 30min.Adjust the power supply voltage to the rated value of 270V, perform the performance test of the UUT according to the performance test procedure of the electrical equipment,to confirm that the UUT can automatically restore its performance specified in the normal state of power supply and is not damaged.

Data such as voltage, duration, whether the restart is successful and UUT performance results were recorded for each test condition.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 270V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

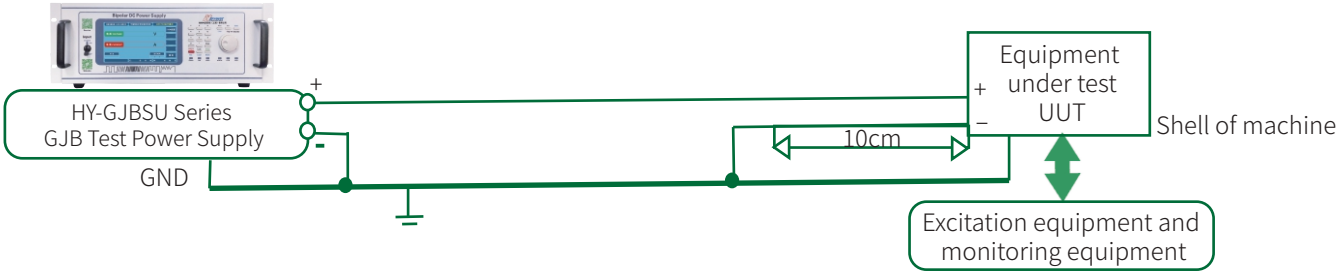


Figure HDC301-1 Abnormal steady-state voltage test conditions

Table HDC301-2 Abnormal steady-state voltage test conditions	
Test condition	Voltage (V)
A	240V
B	290V

3.0、HDC302 Abnormal voltage transient

This test is used to verify that when the power supply voltage of 270V DC electrical equipment appears abnormal stable voltage transient specified in GJB181B-2012,whether it can function properly and maintain its prescribed performance.

The eligibility criteria are as follows：

Table HDC302-1 Transient limit of abnormal voltage

Parameter		Requirement (Typical value)		Corresponding to GJB181B-2012 chapter article number
		Transient voltage (V)	Transient voltage duration (S)	
Abnormal voltage transient	Overvoltage	350	<0.05	Figure 17
		289.6+3.02/t	0.05~7.55	
		290	>7.55	
	Undervoltage	0	7	—
Note: The undervoltage limit curve (0V, 7s) in FIG. 17 of GJB 181B-2012 is an extreme case of abnormal voltage transient of the aircraft power supply system, that is, power supply failure, and should not be used as a qualified criterion for this test project.				

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure HDC302-1.Turn on the power and adjust the voltage to the rated value of 270V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Table HDC302-2 specifies the voltage that the UUT should withstand under each test condition A~N The transient input voltage should rise or fall from the steady-state voltage to the transient voltage within 1ms, its duration is shown in HDC302-2, and then the voltage returns to the steady-state value according to the time listed in the table.

or test conditions C and F, the 350V overvoltage transient duration is 50ms, each interval is 0.5s, three times.For test conditions I and L, the duration of 180V undervoltage transients is 50ms, each interval is 0.5s. Do it three times.For test conditions M and N, a 180V undervoltage transient with a duration of 10ms is immediately followed by a 350V overvoltage transient with a duration of 50ms, and finally the voltage returns to the steady state value.For each test condition, during the voltage transient period, the performance of the UUT was monitored according to the electrical equipment performance test procedure to check whether the UUT could provide its specified performance in the abnormal state of power supply.Each test condition was repeated 5 times. After the power supply is restored to the normal steady-state range, the UUT is tested to verify that the UUT can automatically restore its performance as specified in the normal state of power supply.

Record the steady-state voltage, transient voltage, transient voltage duration, voltage transient (oscilloscope waveform) and UUT performance results under each test condition.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 270V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

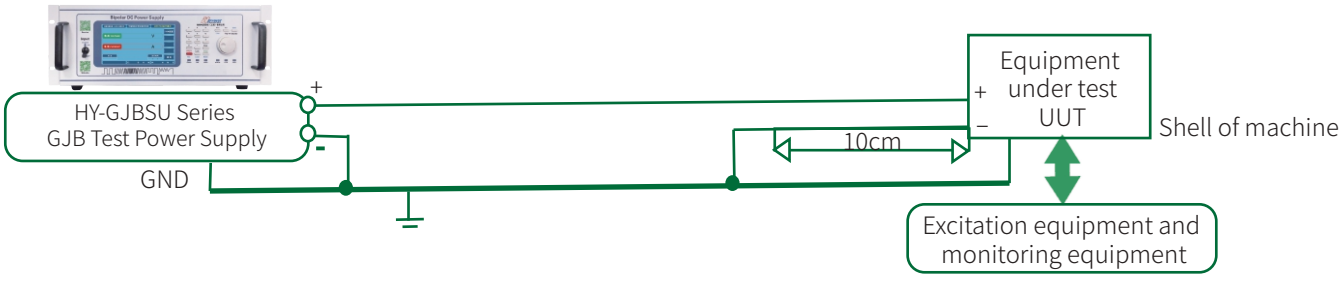


Figure HDC302-1 Typical configuration of non-normal voltage transient test system

Table HDC302-2 Abnormal voltage transient test conditions					
Test condition	Steady-state voltage (V)	Time from steady-state voltage to transient voltage (ms)	Transient voltage (V)	Transient voltage duration (ms)	The time from the transient voltage to the steady state voltage or the next transient voltage
Overvoltage transients					
A	280	<1	350	50	<1ms
B	280	<1	350	50	10ms
		—	340	—[a]	15ms
		—	330	—[a]	25ms
		—	320	—[a]	190ms
		—	300	—[a]	1.71s
		—	280	—	—
C	280	<1	350 (3 times)	50 (Each interval is 0.5s)	<1ms
D	250	<1	350	50	<1ms
E	25	<1	350	50	10ms
		—	340	—[a]	15ms
		—	330	—[a]	25ms
		—	320	—[a]	190ms
		—	300	—[a]	6.7s
		—	250	—	—
F	250	<1	350 (3 times)	50 (Each interval is 0.5s)	<1ms
Under-voltage transients					
G	280	<1	180	50	<1ms
H	280	<1	180	50	10ms
		—	190	—[b]	15ms
		—	200	—[b]	25ms
		—	210	—[b]	190ms
		—	230	—[b]	6.7s
		—	280	—	—

270V Test Item

Table HDC302-2 Abnormal voltage transient test conditions					
Test condition	Steady-state voltage (V)	Time from steady-state voltage to transient voltage (ms)	Transient voltage (V)	Transient voltage duration (ms)	The time from the transient voltage to the steady state voltage or the next transient voltage
Undervoltage transient					
I	280	<1	180 (3 times)	50 (Each interval is 0.5s)	<1ms
J	250	<1	180	50	<1ms
K	250	<1	180	50	10ms
		—	190	—[b]	15ms
		—	200	—[b]	25ms
		—	210	—[b]	190ms
		—	230	—[b]	1.71s
		—	250	—	—
L	250	<1	180 (3 times)	50 (Each interval is 0.5s)	<1ms
Mixed transient					
M	280	<1 <1	180 350	10 50	<1ms 10ms
		—	340	—[a]	15ms
		—	330	—[a]	25ms
		—	320	—[a]	190ms
		—	300	—[a]	1.71s
		—	280	—	—
N	250	<1 <1	180 350	10 50	<1ms 10ms
		—	340	—[a]	15ms
		—	330	—[a]	25ms
		—	320	—[a]	190ms
		—	300	—[a]	6.7s
		—	250	—	—
a: Voltage gradually decreases b: Voltage gradually increases					

3.1、HDC401 Emergency steady-state voltage

This test is used to verify that when the supply voltage of the DC 270V electrical equipment appears the emergency steady-state voltage limit specified in GJB181B-2012,whether it can function properly and maintain its prescribed performance.

The eligibility criteria are as follows:

Table HDC401-1 Emergency steady-state voltage and frequency limits		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Emergency steady State Voltage Lower limit (ELSS) voltage	250V	Table 4
Emergency stable voltage Upper limit (EHSS) voltage	280V	

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure HDC401-1.Turn on the power and adjust the voltage to the rated value of 270V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Adjust the power supply voltage according to the test conditions A and B in Table HDC401-2 respectively to supply power to the UUT.Under each test condition, power off the UUT and then power it on again to check whether the UUT can be restarted.After restart, perform performance test on the UUT according to the performance test procedure of the electrical equipment to check whether the UUT can provide the performance specified in the emergency power supply state: the duration is not less than 30min, so as to verify that the UUT can continuously work normally under the emergency steady-state voltage limit.

Adjust the power supply voltage to the rated value of 270V, perform the performance test of the UUT according to the performance test procedure of the electrical equipment,to confirm that the UUT can automatically restore its performance specified in the normal state of power supply and is not damaged.

Data such as voltage, duration, whether the restart is successful and UUT performance results were recorded for each test condition.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 270V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

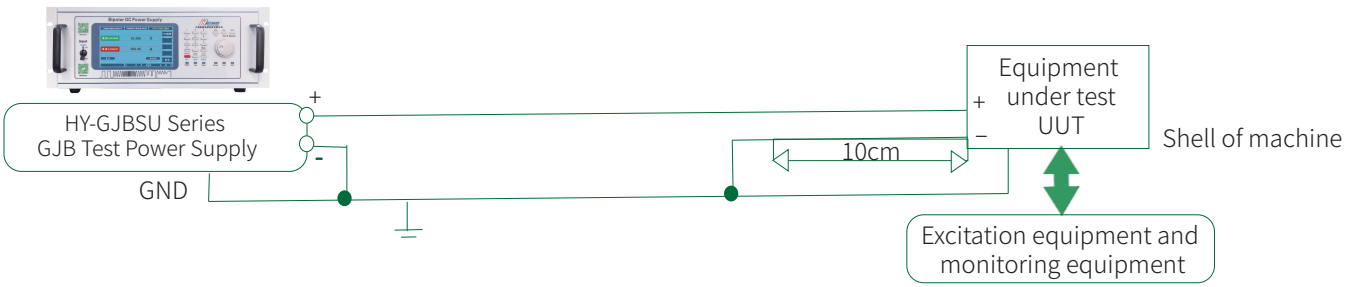


Figure HDC401-1 Typical configuration of emergency steady-state voltage test system

Table HDC401-2 Emergency steady-state voltage test conditions		
Test condition	Voltage (V)	Duration of time (min)
A	250V	30
B	280V	30

3.2、HDC501 Starting voltage transient

This test is used to verify that when the supply voltage of DC 270V electrical equipment is the starting voltage transient specified in GJB181B-2012,whether it can work properly and maintain the prescribed performance.

The eligibility criteria are as follows:

Table HDC501-1 Transient limit of starting voltage		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Starting voltage transient	115V~280V	—

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure HDC501-1.Turn on the power and adjust the voltage to the rated value of 270V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

The UUT shall withstand the starting voltage transients specified in Table HDC501-2, in which the input voltage decreases from the steady-state value to 115V within 1ms and then increases to the steady-state value at a constant rate within 30s.During each start-up voltage transient, the performance of the UUT was tested according to the electrical equipment performance test procedure to check whether the UUT could provide its specified performance in the electrical start-up state.Repeat five times.

Record steady-state voltage, transient voltage, recovery time, voltage transient (oscilloscope waveform) and UUT performance results.

After the power supply is restored to the normal steady state range, the UUT performance test is carried out to verify that the UUT can automatically restore its performance specified in the normal state of power supply.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 270V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

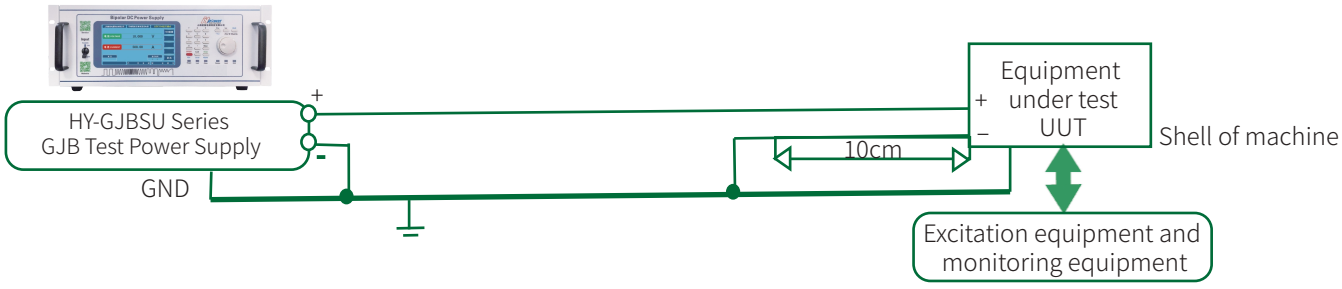


Figure HDC501-1 Typical configuration of starting voltage transient test system

Table HDC501-2 Starting voltage transient test conditions				
Test condition	Steady-state voltage (V)	Time from steady-state voltage to transient voltage (ms)	Transient voltage	The time from the transient voltage to the steady state voltage or the next transient voltage (ms)
A	280V	<1ms	115V	30s

3.3、HDC601 Power failure

This test is used to verify that when the power supply voltage of the DC 270V electrical equipment is cut off according to GJB181B-2012,whether it can work properly and maintain the prescribed performance.

The eligibility criteria are as follows：

Table HDC601-1 Power off limit		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Power failure	7s	Figure 17

Test method

Pretest inspection

Disconnect the power supply and refer to Figure HDC601-1 to install the UUT and HY-GJBSU Series GJB Test Power Supply. Turn on the power and adjust the voltage to the rated value of 270V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

The blackout (0V) test was performed according to the duration listed in Table HDC601-2 for each test condition A to D. The UUT input voltage should drop from the steady state voltage to 0V within 0.25ms.The duration of holding 0V is shown in Table HDC601-2, and then the voltage returns from 0V to the steady state value at 0.25ms.For each test condition, the performance test of the UUT is carried out according to the performance test procedure of the electrical equipment to check whether the UUT can provide its specified performance in the condition of power supply failure.After the power supply is restored to the normal steady state range, the performance test of the UUT is carried out according to the performance test procedure of the electrical equipment.To verify that the UUT can automatically recover to its specified performance in the normal state of power supply and is not damaged.

Data such as voltage, outage duration and UUT performance results are recorded for each test condition.

Each test condition was repeated 5 times.

The test was repeated in various operating modes of UUT.

Post-test inspection

After all the above tests are completed, the power supply voltage is adjusted to the rated value of 270V to supply power to the UUT:Perform a performance test on the UUT to confirm that the UUT is not damaged and can provide the performance required under normal power supply.

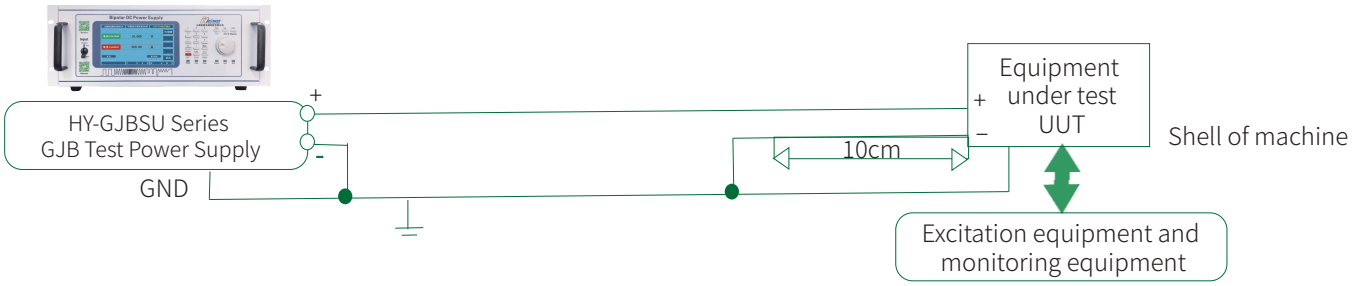


Figure HDC601-1 Typical configuration of power failure test system

Table HDC601-2 Power off test condition	
Test condition	Power outage duration
A	100ms
B	500ms
C	3s
D	7s

3.4、HDC602 Reverse polarity

This test is used to verify that the DC 270V electrical equipment will not be damaged when the supply voltage is reversed polarity, or take effective physical measures to prevent the occurrence of reverse polarity.

The eligibility criteria are as follows：

Table HDC602-1 Reverse polarity fault		
Parameter	Requirement	Corresponding to GJB181B-2012 chapter article number
Reverse polarity fault	The DC equipment should not be damaged due to the reverse connection of positive and negative lines. To prevent input polarity or phase sequence reversal, this requirement can be achieved using proven physical methods.	5.4.6

Test method

Pretest inspection

Disconnect the power supply and install the UUT and HY-GJBSU Series GJB Test Power Supply according to Figure HDC602-1.Turn on the power and adjust the voltage to the rated value of 270V to supply power to the UUT:The performance of the UUT is tested to verify that the UUT can provide its specified performance in the normal state of the power supply.

Test procedure

Consistency check

If effective physical measures have been taken to prevent the occurrence of reverse polarity, the effectiveness of such measures should be verified to confirm that positive and negative lines cannot be reversed.

If the positive and negative lines may be reversed or the measures taken are ineffective, the following tests are performed.

Test procedure

Disconnect the power supply and refer to Figure HDC602 1-2 (positive and negative polarity connection) to install the UUT, excitation equipment and monitoring equipment(When the test power supply can produce negative polarity output, still connect according to Figure HDC602-1, the test power supply can be set to negative voltage output).Turn on the power supply and adjust the voltage to the rated value of 270V to supply power to the UUT;When the power input is in reverse polarity state, keep the power supply for at least 30 minutes to verify that the UUT will not be damaged or cause unsafe state due to the power input wire connection.

Data such as steady-state voltage, reverse polarity duration and UUT performance results are recorded.

The test was repeated in various operating modes of UUT.

Post-test inspection

Disconnect the power supply and install the UUT, excitation equipment and monitoring equipment according to Figure HDC602-1(positive and negative lines are correctly connected).Turn on the power supply and adjust the voltage to the rated value of 270V,supply power to the UUT to ensure that the UUT has not been damaged or caused an unsafe condition due to the reverse polarity of the supply, maintain power supply at least 30mn:Perform performance tests on the UUT according to the electrical equipment performance test procedure to confirm that the UUT has recovered its performance as specified in the normal state of power supply and is not damaged.

Record steady-state voltage, duration of test conditions and UUT performance results. See Figure HDC602-3 for the test data records.

The above tests were repeated in various operating modes of UUT.

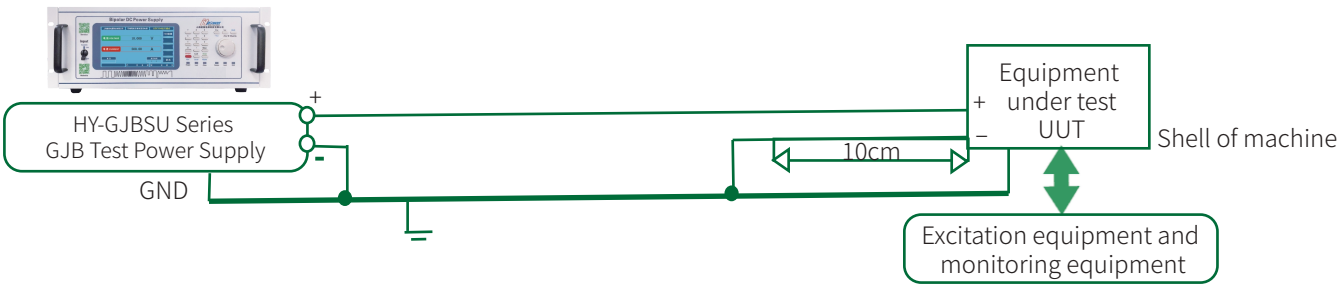


Figure HDC602-1 Typical configuration of polarity correct connection test system

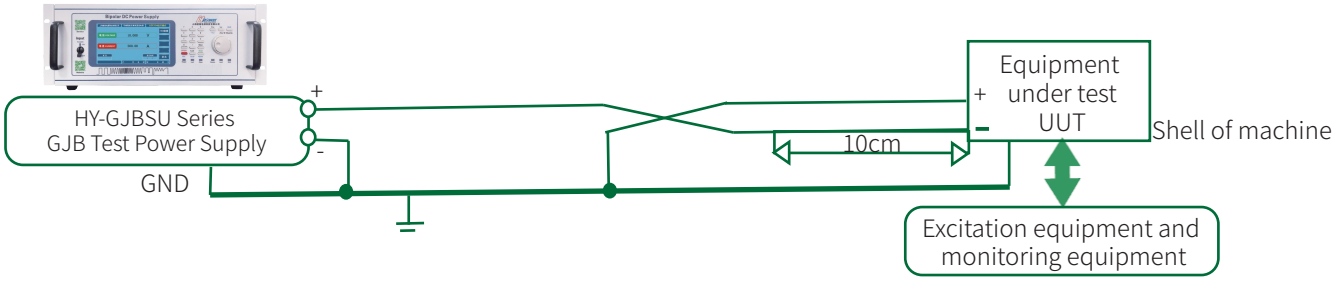
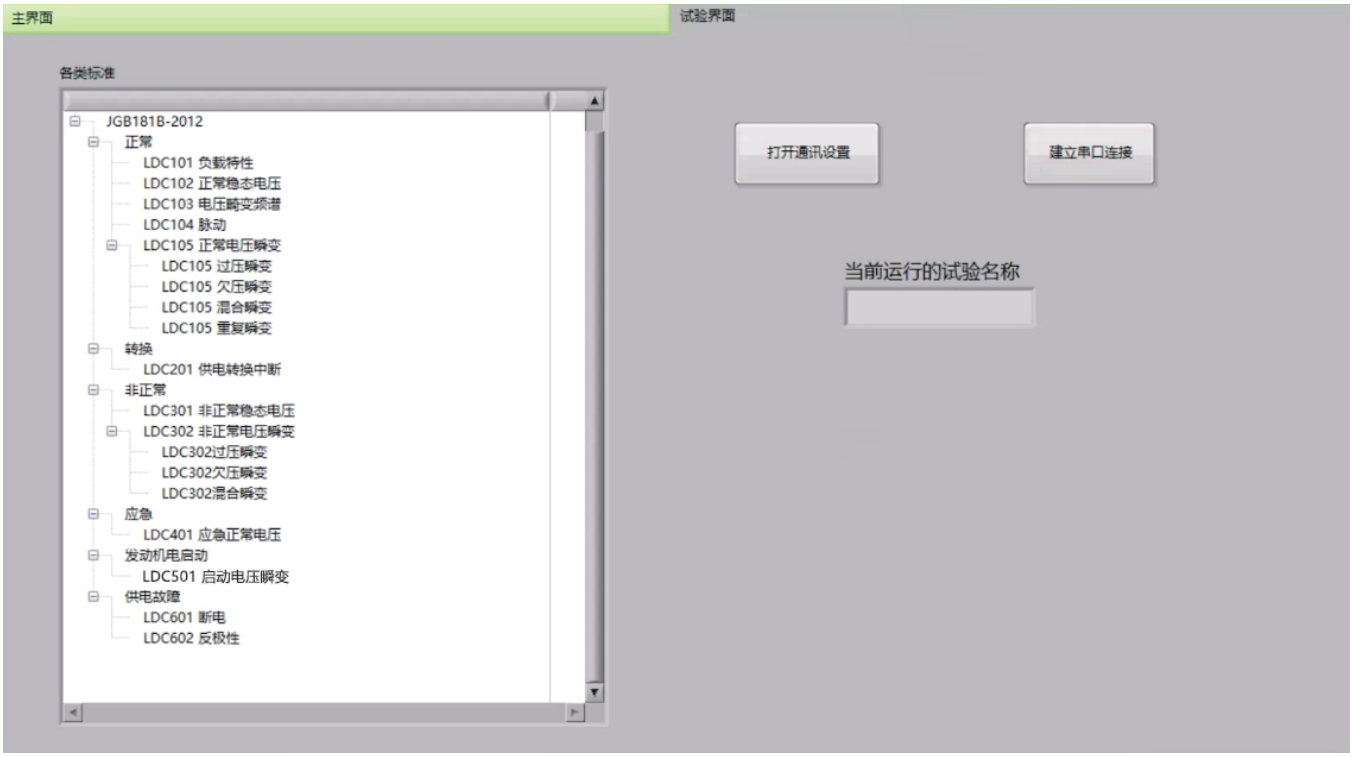


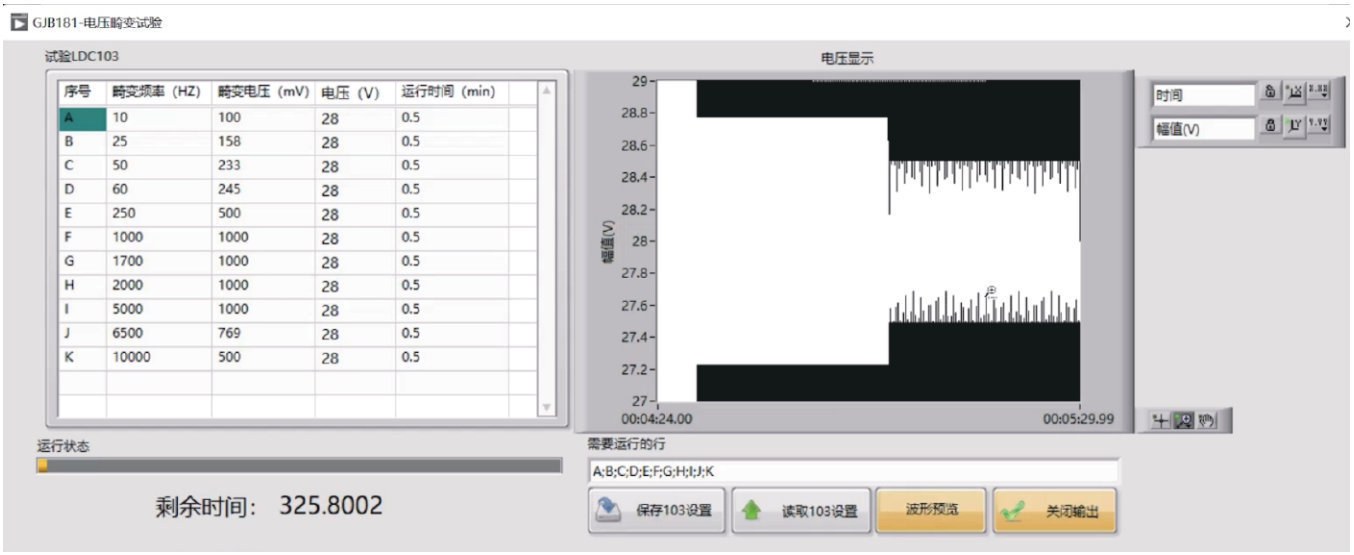
Figure HDC602-2 Typical configuration of reverse polarity connection test system

Description Of The Upper Computer

Self-equipped upper computer software, built-in GJB181B-2012 aircraft power supply characteristics standard DC 28V\270V test all items, entries are clear.Directly click on the test item to open the special page.The default value within each test item is the standard value.Customers can also click the panel to modify the value according to their own needs.

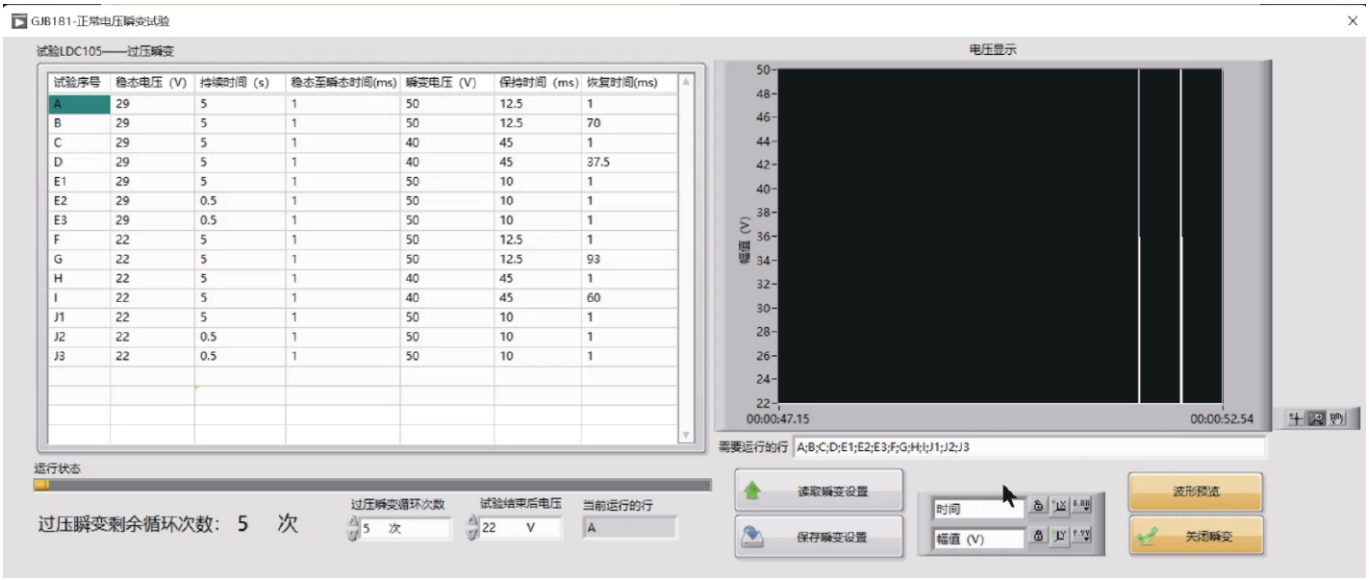


Upper computer software homepage

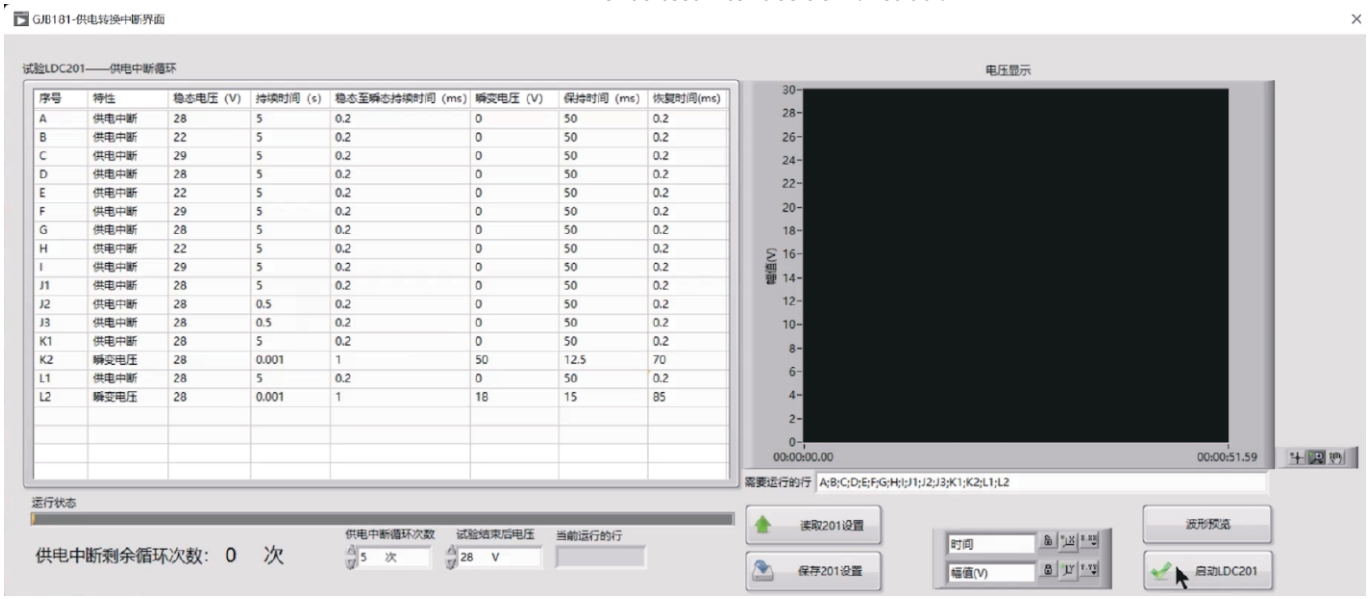


LDC103 test interface demonstration

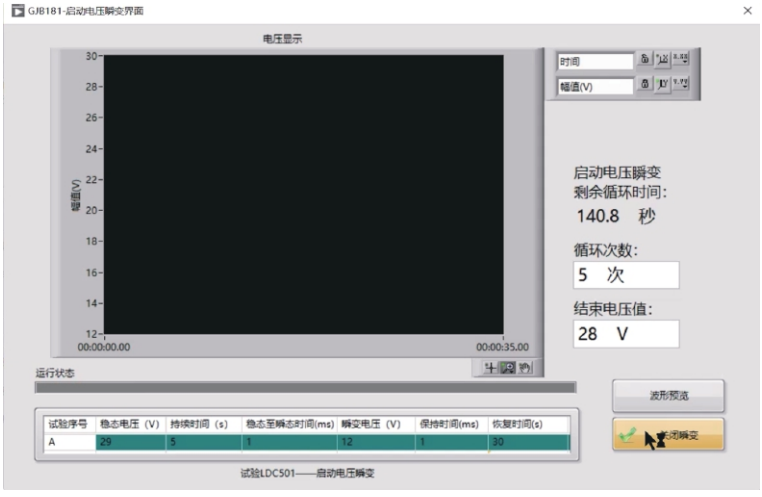
Upper Computer Software Display



LDC105 test interface demonstration

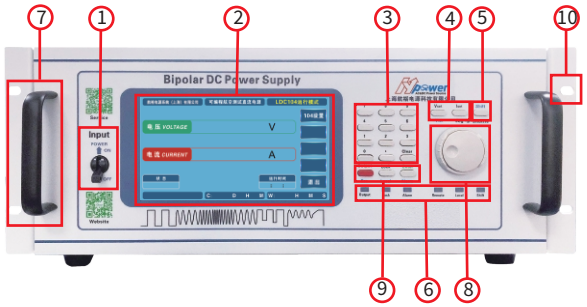


LDC201 test interface demonstration



LDC501 test interface demonstration

Display Screen



① Power input circuit breaker
② 7-inch LCD display window display:Voltage and current setting value,Voltage and current measurement value, function setting menu
③ Function button: for the required value input and parameter setting
④ Voltage/current setting key
⑤ Shift function reuse key
⑥ Status indicator light
⑦ Case handle
⑧ Multi-stage adjustment knob, the inner ring adjust one word each time, the outer ring is divided into ±8 segments adjustable
⑨ Lock、Enter、Esc、Local、Reset、Alarm、Output ON/OFF
⑩ 19 inch standard rack mounting holes

Display Screen

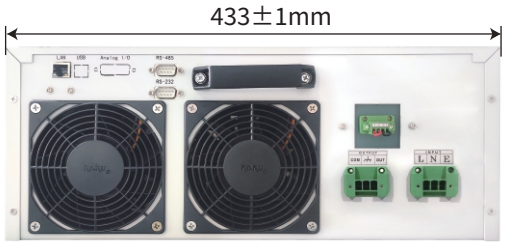
状态	畸变频率 (Hz)	畸变电压 (mV)	电压 (V)	是否叠加	运行时间
A	10.00	100.00	28.00		: :
B	25.00	158.00	28.00		: :
C	50.00	233.00	28.00		: :
D	60.00	245.00	28.00		: :
E	250.00	500.00	28.00		: :
F	1000.00	1000.00	28.00		: :
G	1700.00	1000.00	28.00		: :
H	2000.00	1000.00	28.00		: :
I	5000.00	1000.00	28.00		: :
J	6500.00	707.00	28.00		: :
K	10000.00	500.00	28.00		: :

状态	畸变频率 (Hz)	畸变电压 (mV)	电压 (V)	是否叠加	运行时间
A	1200.00	800.00	28.00		: :
	2400.00	160.00	28.00		
	3600.00	260.00	28.00		
	4800.00	80.00	28.00		
	6000.00	130.00	28.00		
	7200.00	40.00	28.00		
	8400.00	60.00	28.00		
B	2400.00	800.00	28.00		: :
	4800.00	160.00	28.00		
	7200.00	260.00	28.00		
	9600.00	80.00	28.00		
	12000.00	130.00	28.00		
	14400.00	40.00	28.00		
	16800.00	60.00	28.00		

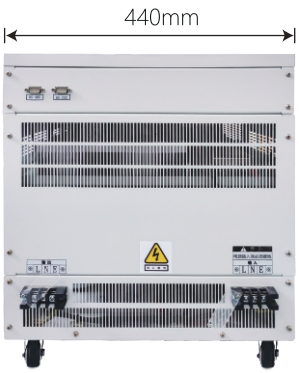
Appearance & Size

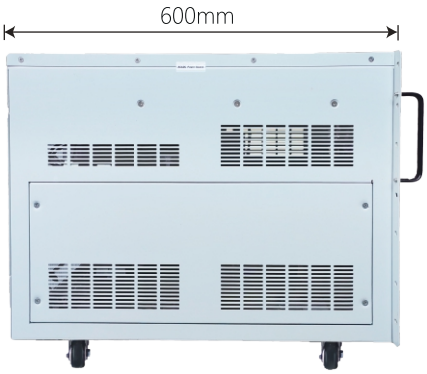
Dimensions Of Appearance

4U 433(W)*560(D)*177(H)mm



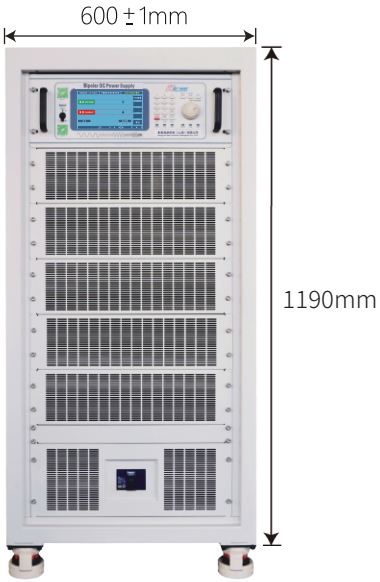
10U 440(W)*600(D)*445(H)mm

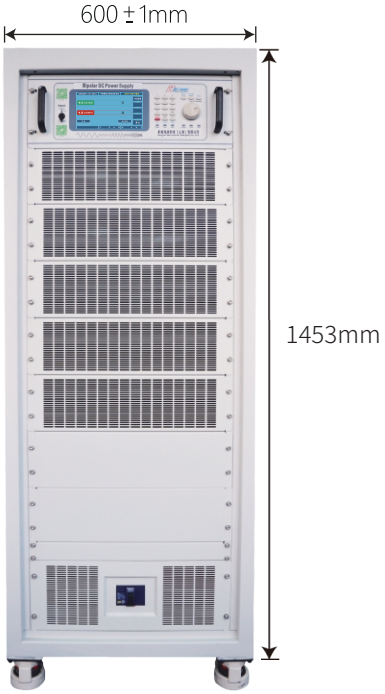


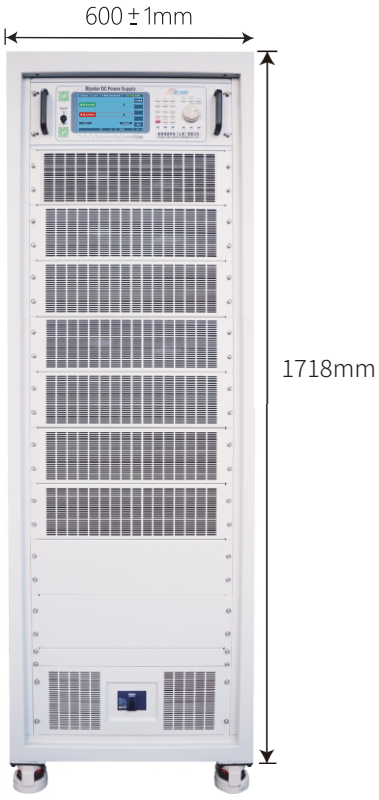


18U 600(W)*800(D)*920(H)mm

24U 600(W)*800(D)*1190(H)mm
30U 600(W)*800(D)*1453(H)mm
36U 600(W)*800(D)*1718(H)mm







Cooperative Customers (Part)

Cooperative Customers (Part)

Aerospace & Defense Military Research Lnstitute

China Aerospace

Aerospace science and engineering

Aviation industry

China Air Development

China Electrical Engineering Group

China Shipbuilding Corporation

China Shipbuilding Industry Corporation

CASC 800 (Shanghai Aerospace Precision Machinery Research Institute)
CASC 801 (Shanghai Space Propulsion Research Institute)
CASC 803 (Shanghai Aerospace Control Technology Institute)
CASC 804 (Shanghai Aerospace Electronic Communication Equipment Research Institute)
CASC 805 (Shanghai Aerospace System Engineering Institute)
CASC 808 (Shanghai Precision Measurement and Testing Institute)
CASC 811 (Shanghai Space Power Research Institute)
CASC 812 (Shanghai Satellite Equipment Research Institute)
CASC 502 (Beijing Control Engineering Research Institute)
CASC 510 (Lanzhou Institute of Space Technology Physics)
CASC 203 (China Ordnance Industry 203 Research Institute)
CASIC 206 (Beijing Machinery and Equipment Research Institute)
CASIC 242 Factory (Lanzhou Flight Control limited liability company)
CASIC 307 Factory (Aerospace Chenguang Co., LTD.)
CASIC 33(33 Aerospace Science and Industry Institutes)
CASIC 3651 Factory (Guizhou Aerospace Linquan Motor Co., LTD.)
AVIC 603 (Avic Xi 'an Aircraft Design and Research Institute)
AVIC 613 (Aviation Industry Corporation of China Luoyang electro-optical equipment Research Institute)
AVIC 615 (Aeronautical Radio Electronics Research Institute of China)
AVIC 618 (Xi 'an Flight Automatic Control Research Institute)
AVIC 631 (Avic Aeronautical Computing Technology Research Institute)
AVIC 105 Factory (Tianjin Aviation Electromechanical Co., LTD.)
AVIC 115 Factory (Shaanxi Aero Electric Co., LTD.)
AVIC 118 Factory (Shanghai Aviation Electric Appliance Co., LTD.)
AVIC 135 Factory (The state operates Wanli electromechanical factory)
AVIC 181 Factory (Wuhan Aviation Instrument Co., LTD.)
AVIC 304 (Beijing Great Wall Institute of Measurement and Testing Technology)
AECC 606 Institute (Shenyang Engine Research Institute)
AVIC 607 Institute (China Leihua Electronic Technology Institute)
CETC 14 Institute (Nanjing Institute of Electronic Technology)
CETC 21 Institute (Shanghai Micromotor Research Institute)
CETC 23 Institute (Shanghai Transmission Line Research Institute)
CETC 36 Institute (Jiangnan Institute of Electronic Communication)
CETC 38 Institute (East China Institute of Electronic Engineering)
CETC 50 Institute (Shanghai Microwave Technology Research Institute)
CETC 51 Institute (Shanghai Microwave Equipment Research Institute)
CETC 54 Institute (Shijiazhuang Communication Measurement and Control Technology Research Institute)
CETC 55 Institute (Nanjing Institute of Electronic Devices)
CSIC 707 Institute (Tianjin Institute of Marine Instruments)
CSIC 7107 (Shaanxi Aerospace navigation equipment Co., LTD)
CSIC 719 Institute (Wuhan Second Ship Design Institute)
CSIC 704 Institute (Shanghai Marine Equipment Research Institute)
CSIC 726 Institute (Shanghai Marine Electronic Equipment Research Institute)
Jiangnan Shipbuilding (Group) Co., LTD
Nanjing Panda Electronics Co., LTD
State-owned 741 Factory (Nanjing Huadong Electronics Group Co., LTD.)
Institute of Modern Physics, Chinese Academy of Sciences

Chinese People's Liberation Army

South Sea Fleet
East China Sea Fleet
North Sea Fleet
Navy Plant 701 / Plant 702
4724 Factory (Shanghai Haiying Machinery Factory)
Unit 95861 (Empty Base 1)
Chinese People's Liberation Army Factory 5720

Commercial Aviation

Commercial Aircraft Corporation of China

Rockwell Collins

Guangzhou Aircraft Maintenance Engineering Co., LTD

Beijing Aircraft Maintenance Engineering Co., LTD

Military Academies & Local Universities

Beijing University of Aeronautics and Astronautics

Aerospace engineering university

Nanjing University of Aeronautics and Astronautics

Air force Engineering University

Naval Aeronautical University

Official wechat：hypower-cn

Contact us

Hangyu Power System (Shanghai) Co., Ltd.

Mobile/Whatsapp:+8613801800699

Fax:+86-21-67285228-8009

Email:sales@hangyupower.com

neo@hangyupower.com

Address: Block B, Building 11, No. 1698 Minyi Road, Songjiang District, Shanghai

Web:www.hangyupower.com

GJB181 Dedicated Test Solution, Version 02.15, July 2025

Authorized distributor：