Indirect Lightning Induced Transient Susceptibility Test System

LIS 100A & LIS 100B

Datasheet

LIS 100A(B)

In Compliance with

> RTCA/DO-160G S22
> MIL-STD-461G
> AECTP 250
> AECTP 500
> GJB 8848-2016
> HB 6167.24

Introduction

When an aircraft is flying in severe convection environment, it will be frequently affected by lightning stroke, which will generate transient induced voltage or current on circuits and cables of airborne equipment, such phenomenon is called indirect lightning effect. It may make the aircraft get out of control, even bring about fuselage fire and other serious accidents. For safety reasons, the airborne equipment must be designed properly and tested completely to ensure the system and equipment with critical safety function to perform normally and its flight security when the aircraft is influenced by lightning stroke.
The LIS 100A and LIS 100B test systems are designed according to RTCA/DO-160 Section 22, The LIS 100A is capable of generating waveforms 1,4 and 5A/5B, and LIS 100B is of waveforms 2, 3 and 6. Both test level are from 1 to 3 for pins injection test and cable bundle test; Additionally, the test system is not only meet the test requirement of lightning induced transients conducted susceptibility in MIL-STD-461G CS117, but also the A/B/C/D EUT pulse injection level requirement in GJB 8848: 2016 is satisfied.
The test system includes various test auxiliary equipment to make it convenient to conduct tests, such as coupling transformer, power blocking device, transient blocking device, pin injection probe, external DC capacitor etc. What's more, the Corelab software is also available for test remote control, which makes your test easy and convenient.

Features

> Modular design, the waveform module is detachable;
> Capable of generating 6 kinds of waveforms and performing pins injection test and cable bundle test;
> 5.7" color touch screen with easy and distinct operation control;
> Phase synchronization function in signal pins & power pins-direct injection method;
> Corelab software are available for remote control;

Application Areas

> Military
> Aviation

Technical Parameters – LIS 100A		
W1		
Coupling Mode	**Cable Induction (CI)**	**Ground Injection (GI)**
Module Selection	**Wave 1-CI/GI**	**Wave 1-CI/GI**
Current Waveform	6.4 µs ± 20 % / 69 µs ± 20 %	6.4 µs ± 20 % / 69 µs ± 20 %
Single-Stroke	25 A – 1000 A +20%, -0%	25 A – 1000 A +20%, -0%
Multiple-Stroke	25 A – 1000 A +20%, -0% (First stroke); 25 A – 350 A +50%, -0% (Subsequent stroke)	25 A – 1000 A +20%, -0% (First stroke); 25 A – 350 A +50%, -0% (Subsequent stroke)
No. of Subsequent Strokes	1 – 14 adjustable	1 – 14 adjustable
Time Intervals of Subsequent Strokes	10 ms – 200 ms adjustable, uniformity mode or random mode	10 ms – 200 ms adjustable, uniformity mode or random mode
Polarity	+, -	+, -
Current Coupling Device	LCT-1	LCT-1
No. of Tests	1 – 99	1 – 99
Test Repetition	30 s – 60 s	30 s – 60 s
EUT Load Capacity	/	AC 230 V, 16 A, 50 Hz / 60 Hz, & DC

Technical Parameters – LIS 100A		
W4		
Coupling Mode	**Cable Induction (CI)**	**Ground Injection (GI)**
Module Selection	**Wave 4-CI/GI**	**Wave 4-CI/GI**
Voltage Waveform	6.4 µs ± 20 % / 69 µs ± 20 %	6.4 µs ± 20 % / 69 µs ± 20 %
Single-Stroke	10 V – 1,700 V +20%, -0%	10 V – 1,700 V +20%, -0%
Multiple-Stroke	10 V – 1,700 V +20%, -0% (First stroke); 10 V – 500 V +50%, -0% (Subsequent stroke)	10 V – 1,700 V +20%, -0% (First stroke); 10 V – 500 V +50%, -0% (Subsequent stroke)
No. of Subsequent Strokes	1 – 14 adjustable	1 – 14 adjustable
Time Intervals of Subsequent Strokes	10 ms – 200 ms adjustable, uniformity mode or random mode	10 ms – 200 ms adjustable, uniformity mode or random mode
Polarity	+, -	+, -
Voltage Coupling Device	LVT-1	LVT-1
No. of Tests	1 – 99	1 – 99
Test Repetition	30 s – 60 s	30 s – 60 s
EUT Load Capacity	/	AC 230 V, 16 A, 50 Hz / 60 Hz, & DC

Technical Parameters – LIS 100A	
W4	
Coupling Mode	**Pin Injection (PI)**
Module Selection	**Wave 4-PI**
Output Impedance	5 Ω ±10%
Voltage/Current Waveform	6.4 µs ±20% / 69 µs±20%
Single-Stroke	25 V – 800 V +10%, -0% (open-circuit voltage); 5 A – 160 A +10%, -0% (short-circuit current);
Polarity	+, -
No. of Tests	1 - 99
Test Repetition	10 s – 60 s (the min. depends on the output amplitude)
EUT Power Sync	Synchronized automatically with AC power peak value or 0°~359° (resolution 1°， tolerance less than 10°)
EUT Load Capacity	AC 230 V, 800 Hz

Technical Parameters – LIS 100A		
W5A		
Coupling Mode	**Cable Induction (CI)**	**Ground Injection (GI)**
Module Selection	**Wave 5A-CI/GI**	**Wave 5A-CI/GI**
Current Waveform	40 µs ± 20 % / 120 µs ± 20 %	40 µs ± 20 % / 120 µs ± 20 %
Single-Stroke	20 A – 2,000 A +20%, -0%	20 A – 2,000 A +20%, -0%
Multiple-Stroke	20 A – 2,000 A +20%, -0% (First stroke); 20 A – 800 A +50%, -0% (Subsequent stroke)	20 A – 2,000 A +20%, -0% (First stroke); 20 A – 800 A +50%, -0% (Subsequent stroke)
No. of Subsequent Strokes	1 – 14 adjustable	1 – 14 adjustable
Time Intervals of Subsequent Strokes	10 ms – 200 ms adjustable, uniformity mode or random mode	10 ms – 200 ms adjustable, uniformity mode or random mode
Polarity	+, -	+, -
Current Coupling Device	LCT-1	LCT-1
No. of Tests	1 – 99	1 – 99
Test Repetition	30 s – 60 s	30 s – 60 s
EUT Load Capacity	/	AC 230 V, 16 A, 50 Hz / 60 Hz, & DC

Technical Parameters – LIS 100A	
W5A	
Coupling Mode	**Pin Injection (PI)**
Module Selection	**Wave 5A-PI**
Output Impedance	1 Ω ±10%
Voltage/Current Waveform	40 µs ± 20 % / 120 µs ± 20 %
Single-Stroke	25 V – 800 V +10%, -0% (open-circuit voltage); 25 A – 800 A +10%, -0% (short-circuit current);
Polarity	+, -
No. of Tests	1 - 99
Test Repetition	10 s – 60 s (the min. depends on the output amplitude)
EUT Power Sync	Synchronized automatically with AC power peak value or 0°~359° (resolution 1°， tolerance less than 10°)
EUT Load Capacity	AC 230 V, 800 Hz

Technical Parameters – LIS 100B	
W2	
Coupling Mode	**Cable Induction (CI)**
Rise Time	< 100 ns
Duration	6.4 µs ±20 %
Single-Stroke	25 V – 1,600 V +20%, -0%
Multiple-Stroke	25 V – 700 V +20%, -0% (First stroke); 25 V – 350 V +50%, -0% (Subsequent Stroke)
Single-Stroke Repetition	2/1 s @ 25 V, 1/1.5 s @ 1,600 V
Polarity	+, -
High-Frequency Voltage Coupling Transformer	LVT-2

Technical Parameters – LIS 100B	
W3	
Coupling Mode	**Pin Injection (PI)**
Module Selection	**W3 – 1 MHz**
Output Impedance	25 Ω
Voltage/Current Repetition	1 MHz ±20%
Attenuation of 5th Stroke	25% - 75%
Single-Stroke	100 V – 700 V +10%, -0%; 4 A – 28 A +10%, -0% (short-circuit current)
Single-Stroke Repetition	2/1 s @ 100 V - 750 V
Polarity	+, -
Phase Sync.	0° - 359°, 1° step
EUT Load Capacity	AC 230 V, DC ±50 V, 800 Hz

Technical Parameters – LIS 100B		
W3		
Coupling Mode	**Cable Induction (CI)**	**Cable Induction (CI)**
Module Selection	**W3 – 1 MHz**	**W3 – 10 MHz**
Voltage/Current Repetition	1 MHz ±20%	10 MHz ±20%
Attenuation of 5th Stroke	25% - 75%	25% - 75%
Single-Stroke	50 V – 2000 V +20%, -0%	50 V – 1600 V +20%, -0%
Multiple-Stroke	50 V – 2000 V +20%, -0% (First stroke); 50 V – 1000 V +50%, -0% (Subsequent stroke)	50 V – 1600 V +20%, -0% (First stroke); 50 V – 800 V +50%, -0% (Subsequent stroke)
Multiple-Burst	50 V – 700 V +20%, -0%	50 V – 800 V +20%, -0%
Single-Stroke Repetition	2/1 s @ 100 V – 750 V	2/1 s @ 100 V – 1,100 V
Polarity	+, -	+, -
High-Frequency Voltage Coupling Transformer	LVT-2	LVT-2

Technical Parameters – LIS 100B	
W6	
Coupling Mode	**Cable Induction (CI)**
Current Waveform	**5 A-75 A**
Rise Time	0.25 μs ±20%
Pulse Width	4 μs ±20%
High-Frequency Voltage Coupling Transformer	LVT-3

General Parameters	
Power Supply Voltage	AC 110 V / 220 V ±10%, 50 Hz /60 Hz ±5% (Default AC 220 V 50 Hz in mainland China)
Max Power	200 W
Operating Temp.	15 ℃ - 35 ℃
Operating Humidity	45% - 75%
Operating Air Pressure	86 kPa – 106 kPa

Standard Accessories
Testing Wire, Fuse *2 (spare part), User Manual, Power Wire, Coaxial Cable, Plug Clip

Options (LIS 100A)	
1. Line Impedance Stabilization Network LISN AR 50 	The LISN AR 50 is used for isolating electric wave in cable bundle test and supply stable impedance for test system; Max AC 530 V, DC 600 V I_{rms}: 50 A; Frequency Range: 10 kHz ~ 400 MHz;
2. Current Coupling Transformer LCT-L5 	The LCT-L5 is used for coupling current waveforms 1,5A,5B and meet the test requirement of single/multiple stroke (level 1~3) test;
3. External DC Capacitor C3350/C33400 	The C3350/C33400 is used together with LISN for conducting cable bundle tests; Maximum DC voltage is 400 V (general configuration is 50 V); Capacitance: 33000 μF;
4. Voltage Coupling Transformer LVT-1 	The LVT-1 is used for coupling voltage waveforms 4, 5A and meet the test requirement of single/multiple stroke (level 1 ~ 3) test;
5. Power Blocking Device CN-1 	The CN-1 is used to isolate voltages at the pins of the EUT from the low generator impedance so as to protect the generator; The maximum isolating ac/dc voltage is 400 V; Meet the test requirement of powered EUT for conducting pins injection test of waveforms 4, 5A, 5B;
6. Transient Blocking Device DN-416T 	The DN-416T is used to prevent EUT power supply from being damaged by pulses 4, 5A and 5B; EUT Maximum ac/dc power supply is 400 V 16 A three-phase, 0 ~ 400 Hz (common mode); Meet the test requirement of powered EUT for conducting pins injection test of waveforms 4, 5A, 5B; **Note: Both LIS 100A and LIS 100B share the DN-416T.**

Options (LIS 100B)	
1. Coupling Transformer LVT-2 	The LVT-2 is used to couple voltage of waveform 2 and waveform 3 (1 MHz & 10 MHz); It satisfies single stroke, multiple stroke and multiple burst tests of cable bundle; Test level is from 1 to 3; Max. coupling voltage is 2000 V for W2; Max. coupling voltage is 4000 V for W3;
2. Coupling Transformer LVT-3 	The LVT-3 is used to couple current of waveform 6; It satisfies multiple burst tests of cable bundle; Test level is from 1 to 3; Max. coupling current is 160 A;
3. Power Blocking Device CN-2 	The CN-2 is used to isolate voltages at the pins of the EUT from the low generator impedance in waveform 3 pins direct injection test;
4. Handheld Pin Injection Probe HIP 5000 	The probe is used in pin injection tests of waveform 3 (1 MHz); Handheld structure design makes pin injection tests convenient;
5. Current Divider MCS 01 	The MCS 01 is used to measure current of waveforms 2, 3 and 6.
6. 35U rack ETS 160MB-35U 	The 35U rack is used to place all devices and accessories to makes the storage in order; There are two main unit storage tanks and four waveform input modules storage tanks, and each tank having sliding rail, which makes it easy to insert or pull out the modules;

Options (Measurements)	
1.Digital Oscilloscope MDO3012 (Tektronix) 	Frequency 100 MHz; Sample Rate 1.25 GS/s; Record length 10 Mb;
2. Wide-band Current Monitor CM 0220M 	Max. peak current 20 kA; Sensitivity 0.01 V/A; Current time product: 1 A·s;
3. Differential Probe THDP0100 (Tektronix) 	6 kV differential mode, 100 MHz; The THDP0100 is used for measuring voltage of all waveforms

Control Software	
Corelab	The software is used for remote control; Support connection with oscilloscope for monitoring waveforms; support generating test report;