COMPLIANCE WEST USA

STUDY REPORT

TITLE CDT-240 Impidance Evaluation **CHASSIS (FAMILY):**

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PURPOSE: To measure the Impedance of the CDT-240 tester

REPORT No.: SR-CDT-001

EFFECTIVE DATE: 5/23/2014

MODELS AFFECTED: CDT-240

ANALYZED SET:

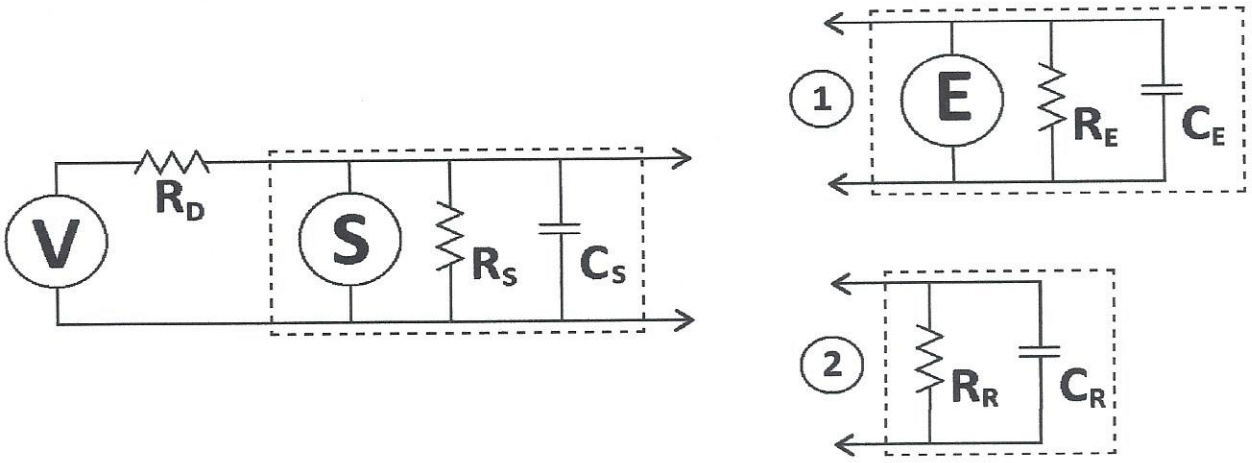
Conclusion:

The actual test results are presented in Table 1. Because the voltages measured in tests 5 and 6 are higher than the voltage measured in test 8 (only slightly higher), the resistive input impedance of circuit (1) is higher (only slightly higher) than the resistive impedance of circuit (2). Because the voltages measured in tests 3 and 4 are higher than the voltage measured in test 7, the overall input impedance of circuit (1) is higher than the overall impedance of circuit (2). This result also indicates that the capacitance of circuit (1) is lower than the capacitance of circuit (2), i.e. the capacitive impedance of circuit (1) is higher than the capacitive impedance of circuit (2).
Based on these results, the equivalent input resistance of the equipment being evaluated is greater or equal to 100MOhm, and the equivalent input capacitance is less than or equal to 25pF.

Legend and Test Setup:

V: Voltage source, (a) 100 Vdc and (b) 240Vdc
R_D: Voltage divider resistor, 100MOhm, 1%
S: Tektronics DPO3012 oscilloscope and Tektronics P6015 1000x probe
R_S: Resistance of scope and probe, 100 MOhm
C_S: Capacitance of scope and probe, 3pF
E: Equipment being evaluated, Compliance Products CDT-240
R_E: Resistance of equipment being evaluated
C_E: Capacitance of equipment being evaluated
R_R: Reference resistor, 100MOhm, 1%
C_R: Reference capacitor, 25pF, 1%

* SIDE EFFECT:	Cost Up/Down		$
	BOM		
	PWB LAYOUT		
	SCHEMATICS		
	SPECS/MANUAL		
	SOFTWARE		
	DATA		
	OTHER ( )		



Test Method:

Important Safety Information: Hazardous voltages are present during this test. Appropriate care must be taken to ensure operator safety.
Note: The circuits being measured and evaluated are very high impedance. Therefore the measurements are subject to significant levels of noise which can contribute to errors in measurement. To reduce noise from stray line-frequency fields, additional isolation was employed during testing, as follows:

- The oscilloscope mains input was powered by an external 1:1 isolation transformer with no ground connection to the scope.

- The equipment being evaluated mains input was powered by an external 1:1 isolation transformer with no ground connection to the chassis of the equipment.

- The voltage sources (a) and (b) were isolated from mains.
Prior to making voltage measurements, it was verified that line-frequency noise had been minimized before proceeding.

Voltage sources (a) and (b) are connected in turn, and the open-circuit voltage is measured using the oscilloscope and probe. Note that the actual voltage of the voltage sources and the resistance of R_D are not critical; other values may be used.
Connect circuit (1), the equipment being evaluated, and measure the voltage using the oscilloscope and probe. The measured voltage is expected to be lower than the open-circuit voltage because of the additional load of the equipment being evaluated. If the equipment being evaluated has more than one operating mode, measure the voltage in all operating modes.
Remove circuit (1) and connect circuit (2). Measure the voltage of the oscilloscope and probe. The measured voltage is expected to be lower than the open-circuit voltage.
Theory of Operation:

Because the equipment being evaluated has active circuitry, it is not possible to make accurate measurements using an LCR meter or similar instruments. The equipment being evaluated must be energized (turned on) and configured in the appropriate state so that the true input impedance of the circuitry is presented.
The open-circuit voltage measurements that are performed first are technically not open-circuit, because the 100MOhm, 25pF load of the oscilloscope probe causes a significant amount of voltage to be dropped across the voltage divider resistor R_D. The actual voltages measured when (a) and (b) are connected are not critical, but are simply for reference.
When voltage source (a) is connected (an AC voltage source), the combined resistive and capacitance impedances are measured. When voltage source (b) is connected, only the resistive element of the circuit impedance is measured because the capacitance appears as an open-circuit.
When the equipment being evaluated (1) is connected, the voltages measured by the oscilloscope and probe will be lower than the "open-circuit" measurements because of the additional load of the equipment being evaluated. Similarly, the voltages measured by the oscilloscope and probe will be lower than the "open-circuit" measurements when (1) is removed and circuit (2) is connected.

Circuit (2) represents the nominal impedance that is the pass/fail threshold of 100MOhms in parallel with 25pF that is referenced in the CTL Decision Sheet P-DSH-0716 (refer to Appendix B for details).
If the voltages measured when circuit (1) is connected are higher than the voltages measured when (2) is connected, then the impedance of circuit (1) (both the AC and DC impedance) is higher than the impedance of circuit (2). Conversely if the voltages measured when (1) is connected are lower than the voltages measured when (2) is connected, the impedance of circuit (1) is lower than the impedance of circuit (2).

Test no.	Voltage Source	Circuit Connected	Configuration	Measured Voltage (RMS)	Comments
1	AC (a)	scope only (open circuit)	N/A	120	Voltage on the source side of RD will be about twice as high
2	DC (b)	(1)	N/A	50	Voltage on the source side of RD will be about twice as high
3	AC (a)	(1)	Ref set to Gnd on CDT-240	76	Measured voltage is higher than test 7
4	AC (a)	(1)	Ref set to Gnd on CDT-240	77	Measured voltage is higher than test 7
5	DC (b)	(1)	Ref set to Gnd on CDT-240	33.4	Measured voltage is higher (≈same) as test 8
6	DC (b)	(1)	Ref set to Neutral on CDT-240	33.7	Measured voltage is higher than test 8
7	AC (a)	(2)	N/A	75.3	
8	DC (b)	(2)	N/A	33.3	

Table 1.