Dynamic Series Relay Module

1. BACKGROUND

The Dynamic Series Relay Module solution is targeted at enablement of customers in control cabinet and DIN rail applications who require the galvanic isolation offered by TE Connectivity force guided relay products and the reliable, error free quick connections facilitated by the Dynamic series headers and receptacles.

The solution includes SR series force guided relays, Dynamic 3100 series headers for relay coil drive and Form B / NC contact feedback, and Dynamic 3200 series headers for relay load contact connections.

2. SCOPE

This document includes the list of tests, test setup descriptions, procedures, and results for the device under test related to performance verification testing.

These tests and results are intended to satisfy the verification requirements described in the section Error! Reference source not found..

3. APPLICABLE DOCUMENTS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

3.1. TE Documents

- Dynamic Series Relay Module – Project Requirements Document

4. INTRODUCTION

The Dynamic Series Relay Module is principally a PCB assembling including some number of SR series force guided relays, an equivalent number of Dynamic 3200 series headers for relay load contact connections, and a single Dynamic 3100 series header for relay coil control. A block diagram is provided in Figure 1.

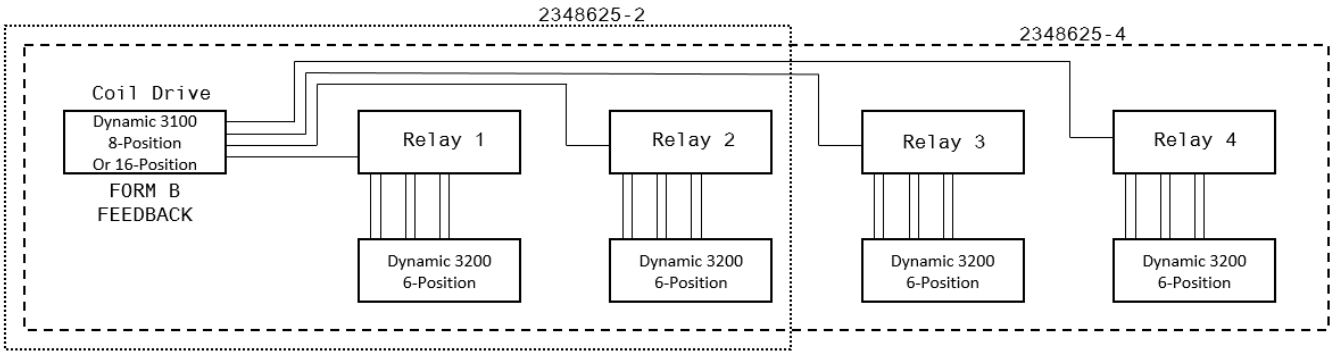

Figure 1 - Dynamic Series Relay Module Block Diagram

The performance criteria tested in this report are concerning thermal performance of the PCB under load, solder quality of the PCB related to thermal stress, and dielectric isolation between the circuits provided. These tests are described in more detail in the section List of Tests below.

5. LIST OF TESTS

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

All tests shall be conducted on fully assembled units, in housings/carriers unless otherwise specified.

<table>
<tr><th>No.</th><th>Test Description</th><th>Requirement</th><th>Procedure</th></tr>
<tr><td>1</td><td>Initial examination of product.</td><td>No visible defects.</td><td>Product must be examined for any defects related to solder, bent or broken contacts, corrosion, charring, discoloration, or other contamination.</td></tr>
<tr><td>2</td><td>Final examination of product.</td><td>No visible defects.</td><td>Product must be examined for any defects related to solder, bent or broken contacts, corrosion, charring, discoloration, or other contamination.</td></tr>
<tr><td></td><td colspan="3">ELECTRICAL</td></tr>
<tr><td>3</td><td>Dielectric Withstand Voltage: Single Circuit</td><td>Must pass with no breakdown or flashover for all pairs of contacts within a relay circuit.</td><td>Set up hi pot tester for 1000 VAC, 60 Hz, 3 second ramp, 1 second dwell, current limit less than 2mA. Each relay circuit must be tested individually. Conduct three tests on each 6-pin header CR1, CR2, … with hi-pot isolation tested between Group X and Group Y as described below:
<table>
<tr><th>Test</th><th>Group X pins</th><th>Group Y pins</th></tr>
<tr><td>1</td><td>A1,A2,A3</td><td>B1,B2,B3</td></tr>
<tr><td>2</td><td>A2,A3,B1</td><td>A1,B2,B3</td></tr>
<tr><td>3</td><td>A3,B1,B2</td><td>A1,A2,B3</td></tr>
</table></td></tr>
<tr><td>4</td><td>Dielectric Withstand Voltage: Multiple Circuit</td><td>Must pass with no breakdown or flashover for all adjacent circuits within a printed circuit board assembly.</td><td>Set up hi pot tester for 1000 VAC, 60 Hz, 3 second ramp, 1 second dwell, current limit less than 2mA. For each test, bundle all pins within a header CR1, CR2, … together and test according to the sequence below:
<table>
<tr><th>Test</th><th>Group X</th><th>Group Y</th></tr>
<tr><td>1</td><td>CR1</td><td>CR2</td></tr>
<tr><td>2</td><td>CR2</td><td>CR3</td></tr>
<tr><td>3</td><td>CR3</td><td>CR4</td></tr>
</table></td></tr>
<tr><td>5</td><td>Dielectric Withstand Voltage: Relay Coil</td><td>Must pass with no breakdown or flashover between coil control circuit header and relay contact headers</td><td>Set up hi pot tester for 1000 VAC, 60 Hz, 3 second ramp, 1 second dwell, current limit less than 2mA.
For this test, bundle all pins within header XSCOIL together, forming Group X. Bundle all pins from all relay contact headers CR1, CR2, … together forming Group Y.</td></tr>
</table>

No.	Test Description	Requirement		Procedure
6	Temperature Rise vs Current	4A Test	50ºC T-rise maximum for coil and LED drive circuitry, Relay surface, and PCB Traces.	EIA 364-70A, Method 1 Set up bulk DC current source with current limit of 4A. Connect all relay contact positions in series using wire harnesses connected to headers CR1, CR2, … and connect to DC power source. Use second 24V DC source to activate all relay coils via header XSCOIL. Turn on both DC sources and ensure 4A is flowing. Allow circuit to operate for at least 1 hour or until temperature stabilizes and capture image. Repeat procedure with 6A current.
		6A Test	60ºC T-rise maximum for coil and LED drive circuitry, and Relay surface. 70ºC T-rise for PCB traces.	
	ENVIRONMENTAL			
7	Thermal Cycling (-25 to 70°C, 50 cycles)	Unit must maintain operation and continuity throughout temperature cycle profile Contact current 4A.		EIA 364-110, per note below Reproduce test setup from “Temperature Rise vs Current” test inside a programmable thermal chamber. Program chamber for 50 cycles from -25°C to 70°C, with average ramp time of 5°C/min and dwell time of 30 minutes based on chamber air temperature. Set contact current to 4A. Turn on 4A current source and energize relay coils. Monitor continuity of relay contacts throughout the test.
8	Temperature life (70°C, 500 hours)	Unit must maintain operation and continuity throughout temperature life profile Contact current 4A.		EIA 364-17, Method B, Test Condition 2, Test Time Condition C. Reproduce test setup from “Temperature Rise vs Current” test inside a thermal chamber. Program chamber for 500 hours at air temperature of 70C. Set contact current to 4A. Turn on 4A current source and energize relay coils. Monitor continuity of relay contacts throughout the test.
9	Humidity	Humidity test must be followed by DWV (Test No. 3). DWV test should be started within 1 hour.		EIA 364-31B, Method 2, Test Condition A. Subject assembly to 90-95% RH for 96 hours at 40C. Follow immediately with DWV test series as specified in the selected Test Sequence.
	FUNCTIONAL			
10	Functional relay cycle test	LED for each relay must activate when coil is turned on. Associated relay circuits must conduct current when operated and break current when disconnected.		Set up bulk DC current source with current limit of 1A. Connect all relay contact positions in series using wire harnesses connected to headers CR1, CR2, … and connect to DC power source. Connect each coil drive circuit within XSCOIL to a 24V DC voltage source. Turn on all coil drive circuits and verify functionality. Individually turn off or disconnect each coil drive circuit and verify that current flow stops and appropriate LED status is observed.

6. PRODUCT QUALIFICATION TEST SEQUENCE

Test or Examination	Test Group		
	1(a)	2(b)	3(b)
	Test Sequence		
Initial examination of product	1	1	1
Functional relay cycle test	2,4	2,8	2,4
Temperature Rise vs Current	3		
Thermal cycling		3	
Humidity		4	
Dielectric Withstand Voltage: Single Circuit		5	
Dielectric Withstand Voltage: Multiple Circuit		6	
Dielectric Withstand Voltage: Relay Coil		7	
Temperature life			3
Final examination of product	5	9	5

NOTE

(a) Test groups shall include at least 2 units.

(b) Test groups shall include at least 4 units.