

Weibull Cumulative Distribution Function Analysis with Life Expectancy Endurance Test Result of Power Window Switch

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Abstract : This paper presents the planning, rationale for test specification derivation, sampling requirements, test facilities, and result analysis used to conduct lifetime expectancy endurance tests on power window switches (PWS) considering thermally induced mechanical stress under diurnal cyclic temperatures during normal operation (power cycling). The detail process of analysis and test results on the selected PWS set were discussed in this paper. A statistical approach to 'life time expectancy' was given to the measurement standards dealing with PWS lifetime determination through endurance tests. The approach choice, within the framework of the task, was explained. The present task was dedicated to voltage drop measurement to derive lifetime expectancy while others mostly consider contact or surface resistance. The measurements to perform and the main instruments to measure were fully described accordingly. The failure data from tests were analyzed to conclude lifetime expectancy through statistical method using Weibull cumulative distribution function. The first goal of this task is to develop realistic worst case lifetime endurance test specification because existing large number of switch test standards cannot induce degradation mechanism which makes the switches less reliable. 2nd goal is to assess quantitative reliability status of PWS currently manufactured based on test specification newly developed thru this project. The last and most important goal is to satisfy customer' requirement regarding product reliability.

Keywords : power window switch, endurance test, Weibull function, reliability, degradation mechanism

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