

ANSI/ESD SP27.1-2018

ANSI/ESD SP27.1-2018

ESD Association Standard Practice

*For the Recommended Information Flow
for Potential EOS Issues between
Automotive OEM, Tier 1, and
Semiconductor Manufacturers*



*Electrostatic Discharge Association
7900 Turin Road, Bldg. 3
Rome, NY 13440*

*An American National Standard
Approved April 25, 2018*

***ESD Association Standard Practice for the
Recommended Information Flow
for Potential EOS Issues Between
Automotive OEM, Tier 1, and
Semiconductor Manufacturers***

Approved November 30, 2017
EOS/ESD Association, Inc.



**CAUTION
NOTICE**

Electrostatic Discharge Association (ESDA) standards and publications are designed to serve the public interest by eliminating misunderstandings between manufacturers and purchasers, facilitating the interchangeability and improvement of products and assisting the purchaser in selecting and obtaining the proper product for his particular needs. The existence of such standards and publications shall not in any respect preclude any member or non-member of the Association from manufacturing or selling products not conforming to such standards and publications. Nor shall the fact that a standard or publication that is published by the Association preclude its voluntary use by non-members of the Association whether the document is to be used either domestically or internationally. Recommended standards and publications are adopted by the ESDA in accordance with the ANSI Patent policy.

Interpretation of ESDA Standards: The interpretation of standards in-so-far as it may relate to a specific product or manufacturer is a proper matter for the individual company concerned and cannot be undertaken by any person acting for the ESDA. The ESDA Standards Chairman may make comments limited to an explanation or clarification of the technical language or provisions in a standard, but not related to its application to specific products and manufacturers. No other person is authorized to comment on behalf of the ESDA on any ESDA Standard.

**DISCLAIMER OF
WARRANTIES**

THE CONTENTS OF ESDA'S STANDARDS AND PUBLICATIONS ARE PROVIDED "AS-IS," AND ESDA MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESSED OR IMPLIED, OF ANY KIND WITH RESPECT TO SUCH CONTENTS. ESDA DISCLAIMS ALL REPRESENTATIONS AND WARRANTIES, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR USE, TITLE, AND NON-INFRINGEMENT.

**DISCLAIMER OF
GUARANTY**

ESDA STANDARDS AND PUBLICATIONS ARE CONSIDERED TECHNICALLY SOUND AT THE TIME THEY ARE APPROVED FOR PUBLICATION. THEY ARE NOT A SUBSTITUTE FOR A PRODUCT SELLER'S OR USER'S OWN JUDGEMENT WITH RESPECT TO ANY PARTICULAR PRODUCT DISCUSSED, AND ESDA DOES NOT UNDERTAKE TO GUARANTEE THE PERFORMANCE OF ANY INDIVIDUAL MANUFACTURERS' PRODUCTS BY VIRTUE OF SUCH STANDARDS OR PUBLICATIONS. THUS, ESDA EXPRESSLY DISCLAIMS ANY RESPONSIBILITY FOR DAMAGES ARISING FROM THE USE, APPLICATION, OR RELIANCE BY OTHERS ON THE INFORMATION CONTAINED IN THESE STANDARDS OR PUBLICATIONS.

**LIMITATION ON
ESDA's LIABILITY**

NEITHER ESDA, NOR ITS PRESENT OR FORMER MEMBERS, OFFICERS, EMPLOYEES, OR OTHER REPRESENTATIVES, WILL BE LIABLE FOR DAMAGES ARISING OUT OF, OR IN CONNECTION WITH, THE USE OR MISUSE OF ESDA STANDARDS OR PUBLICATIONS, EVEN IF ADVISED OF THE POSSIBILITY THEREOF. THIS IS A COMPREHENSIVE LIMITATION OF LIABILITY THAT APPLIES TO ALL DAMAGES OF ANY KIND, INCLUDING WITHOUT LIMITATION, LOSS OF DATA, INCOME OR PROFIT, LOSS OF OR DAMAGE TO PROPERTY, AND CLAIMS OF THIRD PARTIES.

Published by:

**Electrostatic Discharge Association
7900 Turin Road, Bldg. 3
Rome, NY 13440**

Copyright © 2018 by ESD Association
All rights reserved

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Printed in the United States of America
ISBN: 1-58537-300-1

(This foreword is not part of ESD Association Standard Practice ANSI/ESD SP27.1-2018)

FOREWORD

Electrical Overstress (EOS) is one of the most commonly assigned categories of returns sent back to suppliers (original equipment manufacturer (OEM), Tier 1, etc.) for failure analysis. EOS results from an electrical stress of an electronic component or system outside the allowed specification resulting in pre-damage or even immediate damage of a device. In the past, a deep analysis indicating the clear root cause of failure for every returned part was expected. Such an analysis is challenging, very time consuming, and often root cause finding is not possible. Since the same failure signature can be created by several different stress situations, the success rate of finding a possible root cause event depends on information-sharing and close cooperation between the different tier levels and the OEM.

During discussions between the automotive OEMs, Tier 1s, and semiconductor manufacturers it became obvious that all parties involved see EOS-related cases as a huge opportunity for improvement throughout the automotive industry value chain.

This standard practice¹ document was created to establish a standard information flow process to help solve and reduce EOS problems in the automotive industry in a fast and harmonized way. The work was initiated within USCAR (The United States Council for Automotive Research). USCAR is an umbrella organization of FCA US, Ford, and General Motors, which was formed to conduct cooperative, pre-competitive research. The document was then provided to the ESDA for publication.

Historically, EOS is the result of an unexpected event. The information gathered through this standard practice helps to define what is known about the event. Having this information increases the ability to identify what is unknown and which areas should be further investigated to identify root cause.

The common objective of all parties involved in writing this document turned out to be focusing on the right things to be more efficient in the EOS root cause finding process.

This document was designated ANSI/ESD SP27.1-2018 and approved on November 30, 2017.

¹ **ESD Association Standard Practice:** A procedure for performing one or more operations or functions that may or may not yield a test result. Note that if a test result is obtained, it may not be reproducible.

At the time ANSI/ESD SP27.1-2018 was prepared, the 27.0 EOS Automotive Subcommittee had the following members:

Reinhold Gaertner, Co-Chair Infineon Technologies		James Roberts, Co-Chair Continental Corporation
Andrea Boroni ST Microelectronics	Johnny Che FCA US	Marc Ellis Nexteer
Kai Esmark Infineon Technologies	Mark Harris Ford	Bob Knoell NXP
Tony Lusardi Ford	Kim Mao FCA US	John Mason General Motors
Leon Masseur Infineon Technologies	Hadi Mehrooz Continental Corporation	Thomas J. Murphy General Motors
Joseph Ney General Motors	Todd Peterson Robert Bosch (ecu plant)	Don Price USCAR Representative
Danette Rodriguez Nexteer	Theo Smedes NXP	Michael Stevens NXP Semiconductors
Thomas Stich Renesas Electronics America Inc.	John Taylor Continental Corporation	Christoph Thienel Robert Bosch (semiconductor plant)
Scott Ward Texas Instruments		Matt Yager Ford

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE	1
1.1 PURPOSE	1
1.2 SCOPE	1
2.0 REFERENCED PUBLICATIONS	1
3.0 DEFINITION OF TERMS	1
4.0 TWO LEVEL FAILURE ANALYSIS REPORT SUPPORT	2
4.1 LEVEL 1A SUPPORT	3
4.1.1 <i>Level 1A - Information Provided by the OEM</i>	3
4.1.2 <i>Level 1A - Information Provided by the Tier 1</i>	4
4.1.3 <i>Level 1A - Information Provided by the Semiconductor Manufacturer</i>	5
4.2 LEVEL 1B SUPPORT	5
4.2.1 <i>Level 1B - Information Provided by the OEM</i>	5
4.2.2 <i>Level 1B - Information Provided by the Tier 1</i>	5
4.2.3 <i>Level 1B - Information Provided by the Semiconductor Manufacturer</i>	6
4.3 LEVEL 2 SUPPORT	6
4.3.1 <i>Level 2 - Information Provided by the OEM</i>	6
4.3.2 <i>Level 2 - Information Provided by the Tier 1</i>	8
4.3.3 <i>Level 2 - Information Provided by the Semiconductor Manufacturer</i>	8
 ANNEXES	
Annex A (Informative) – Bibliography	10
Annex B (Informative) – Revision History for ANSI/ESD SP27.1-2018	11

TABLES

Table 1: Definition of Support Levels	3
---	---