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# Aerospace — High power solid state power controller — General performance requirements

FDIS stage

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## Foreword

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This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 1, *Aerospace electrical requirements*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

## Introduction

For aircrafts electrical power systems, there is a trend toward higher voltage and higher current systems. There are several advantages by using a solid-state power controller (SSPC) for the distribution system. A standard of the SSPC for lower electrical power supply has been established~~(6[1]):~~ (ISO 27027); but the standard for the SSPC for higher electrical power supply, which is intended for application in the primary power distribution of aircrafts, has not been established. Therefore, it is necessary to develop a standard for the high-power solid-state power controller (HPSSPC).

The purpose of this document is to ~~:~~

~~—~~standardize the requirements for HPSSPCs that are physically and environmentally diversified;

The HPSSPC:

a) ~~a)~~ consists of a solid-state switching device and its driver circuit;

b) ~~b)~~ turns on or off the power output by receiving the control signal;

c) ~~c)~~ detects the over current in the load which results in limiting this current or shutting down for this current, and/or optionally detects the arc fault in the circuit which results in shutting down the fault;

d) ~~d)~~ has the built-in test function which can detect the health status of itself;

e) ~~e)~~ indicates the on or off status of the power output.

In order to satisfy the purpose of this document, requirements such as physical, environmental and individual items are specified in accordance with the detail requirements that are issued individually.

# Aerospace — High -power solid -state power controller — General performance requirements

## 1 Scope

This document specifies the general performance requirements and test methods to determine the performance of the high-power solid-state power controller (HPSSPC) for use in the primary power distribution of aircrafts.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1540, *Aerospace — Characteristics of aircraft electrical systems*

ISO 7137:1995, *Aircraft — Environmental conditions and test procedures for airborne equipment*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

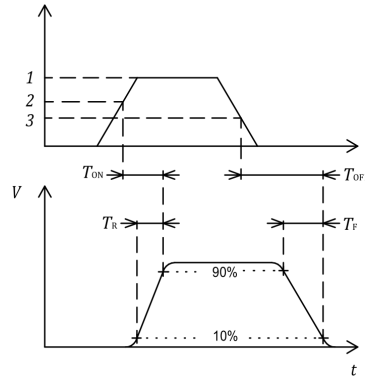
— ISO Online browsing platform: available at https://www.iso.org/obp

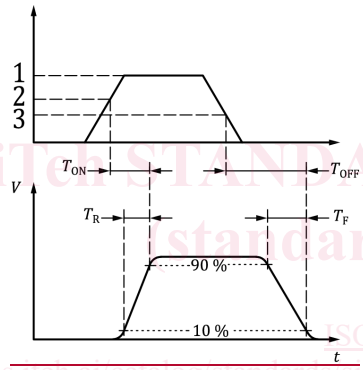
— IEC Electropedia: available at https://www.electropedia.org/



**3.1**
**turn-on time**
<DC device and non-zero crossing turn-on AC device> time interval between the initiation of the *turn-on signal* (3.5) or the latest frame of the turn-on command data packet via the control signal bus and the time when the output reach 90 % of its steady-state on value

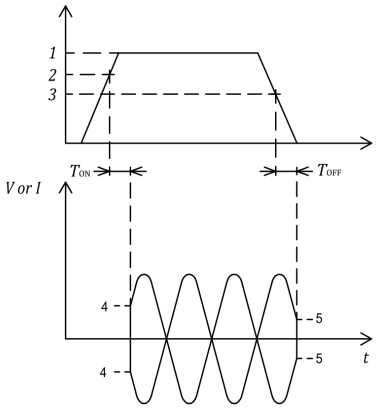
Note 1 to entry: Shown in Figure 1 a).

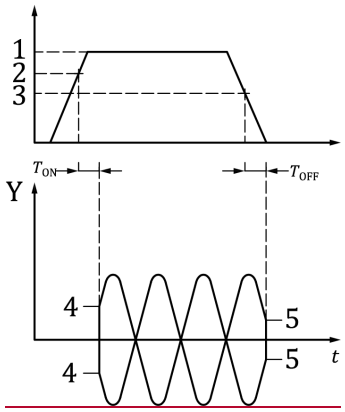





**a) DC HPSSPC**






**b) AC HPSSPC**

**Key**

| | |
|---|---|
| ~~V~~Y | load voltage |
| ~~I~~ | ~~load current~~ |
| $t$ | time |
| $T_{ON}$ | turn-on time |
| $T_{OFF}$ | turn-off time |
| $T_R$ | rise time |
| $T_F$ | fall time |
| ZVTO | zero voltage turn-on |
| ZCVO | zero current turn-off |
| 1 | rated control signal (which may optionally be consist of control bus) |
| 2 | turn on (min) |
| 3 | turn off (max) |
| 4 | zero voltage turn-on |
| 5 | zero current turn-off |



**Figure 1 — Illustration of timing characteristics**

**3.2**
**turn-on time**
<AC device with zero-crossing turn-on> time interval between the initiation of the *turn-on signal* (3.5~~(3.5)~~) or the latest frame of the turn-on command data packet via the control signal bus and the time when the output switch is on at zero crossing

Note 1 to entry: Shown in Figure 1~~Figure 1~~ b).

**3.3**
**turn-off time**
<DC device and non-zero crossing turn-on AC device> time interval between the initiation of the turn-off signal or the latest frame of the turn-off command data packet via the control signal bus and the time when the output reach 10 % of its steady-state on value

Note 1 to entry: Shown in Figure 1~~Figure 1~~ a).

**3.4**
**turn-off time**
<AC device with zero-crossing turn-on> time interval between the initiation of the turn-off signal or the latest frame of the turn-off command data packet via the control signal bus and the time when the output switch is off at zero crossing

Note 1 to entry: Shown in Figure 1~~Figure 1~~ b).

**3.5**
**turn-on signal**
control signal level or turn-on command data packet via the control signal bus at which the power controller is turned on

**3.6**
**turn-off signal**
control signal level or turn-off command data packet via the control signal bus at which the power controller is turned off



**3.7**
**load voltage rise and fall time**
time interval between 10 % and 90 % of the steady state *load voltage* (3.10~~(3.10)~~) value



Note 1 to entry: This definition applies to DC devices and non-zero crossing turn-off AC devices.

Note 2 to entry: The load voltage rise and fall time for DC devices is shown in Figure 1~~Figure 1~~ a).

[SOURCE: ISO 27027:2014, 3.4, modified — "(DC devices and non-zero crossing turn-off AC devices)" has been removed from the term; note 1 to entry has been added instead; the reference to Figure 1~~Figure 1~~ a) has been moved from the end of the definition to note 2 to entry.]

**3.8**
**soft on/off**
function for the power output current to increase linearly with the *turn-on signal* (3.5~~(3.5)~~) or the turn-on command data packet via the control signal bus and to decrease linearly with the turn-off signal or the turn-off command data packet via the control signal bus

**3.9**
**supply voltage**
voltage applied between the power input terminal of the *HPSSPC* (3.13~~(3.13)~~) and the power ground

