ESD Protection of Set top appliances

What are Set top boxes?

The continuing trend is to link broadband signal delivery to the home entertainment display, and other devices via set top boxes. A Set top box is a device that connects an external signal source and decodes that signal into content that can be presented on a display unit such as a TV or monitor.

These devices allow the various cable and satellite signal operators to deliver a wide variety of services from television to Internet and the hardware manufacturers can provide many features and benefits including home networking capabilities. Some functions of the Set top box are: receiving TV network signals, media decompression types, interfacing with displays, command protocol languages, security methods, and running software applications.
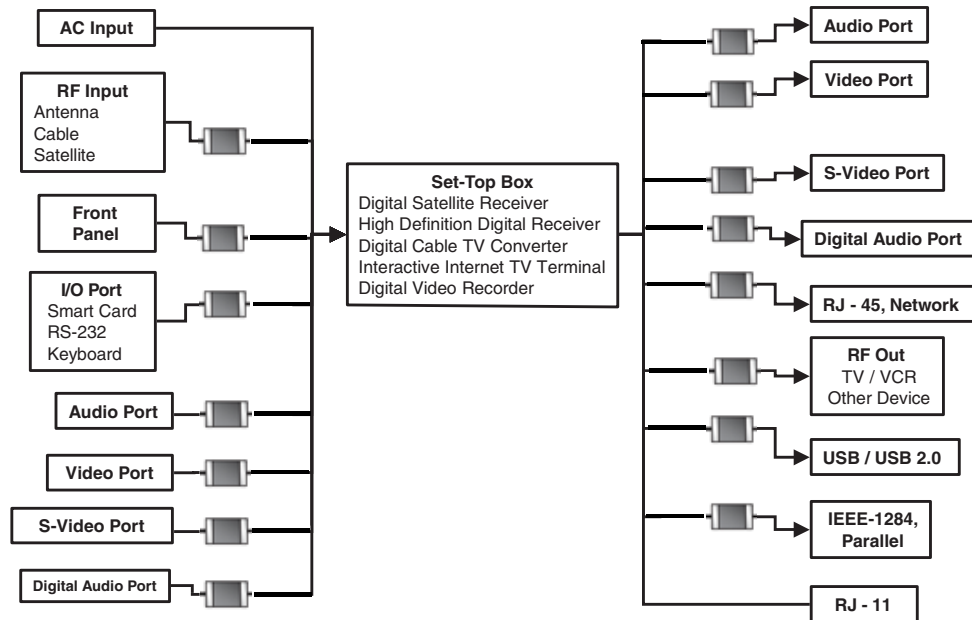
Why are Set top boxes vulnerable to Electrostatic Discharge (ESD)

Set top boxes boxes include a variety of I/O jacks such as front panel USB, Audio/Video, LAN, rear panel Satellite, cable, TV antenna, Wireless transmitter connection, USB, DVI, HDMI, LAN, optical digital input/output, connections for CD, DVD,VCR, Outputs for Video, Audio, and more. Most of these jacks are susceptible to ESD threat.
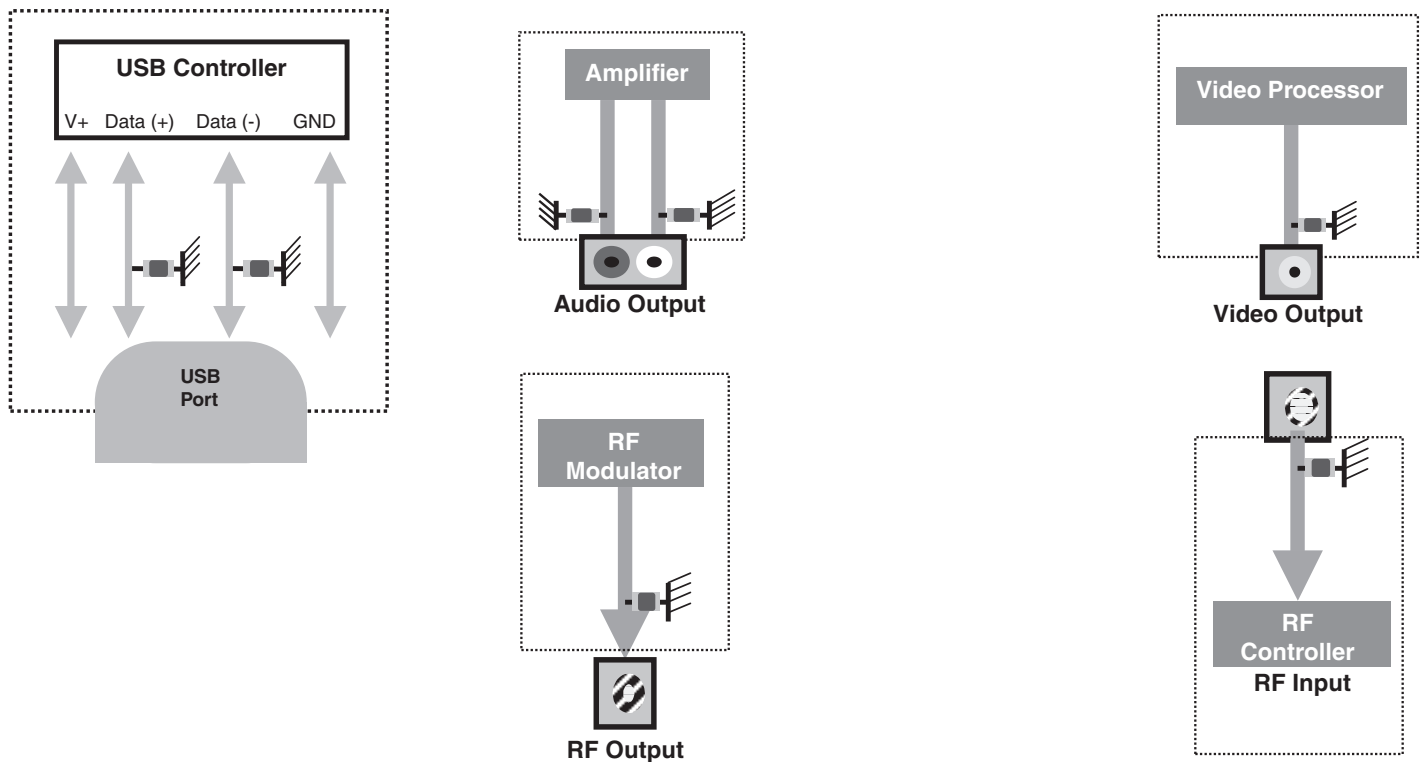
The Voltage Variable Material (VVM) solution to the ESD protection problem

Utilize the 0402ESDA-MLP, 0603ESDA-MLP, PS04LTVA1 or 0603ESDA2-TR2 VVM ESD devices to protect the set top box electronics from catastrophic ESD damage at each potential outside metal contact or connector on each line. Audio, Video, RF, USB and RS-232 lines may be protected from ESD events on set top systems.

Protection against ESD threat for Set top system input/output ports with Eaton's VVM 0402ESDA-MLP, 0603ESDA-MLP, PS04LTVA1 or 0603ESDA2-TR2

AC Input

RF Input
Antenna
Cable
Satellite

Front Panel

I/O Port
Smart Card
RS-232
Keyboard

Audio Port

Video Port

S-Video Port

Digital Audio Port

Set-Top Box
Digital Satellite Receiver
High Definition Digital Receiver
Digital Cable TV Converter
Interactive Internet TV Terminal
Digital Video Recorder

Audio Port

Video Port

S-Video Port

Digital Audio Port

RJ - 45, Network

RF Out
TV / VCR
Other Device

USB / USB 2.0

IEEE-1284, Parallel

RJ - 11

A Typical Set Top Box Rear View

Typical ESD Protection applications with Eaton's VVM 0402ESDA-MLP, 0603ESDA-MLP, PS04LTVA1 or 0603ESDA2-TR2

USB Controller

V+   Data (+)   Data (-)   GND

USB Port

Amplifier

Audio Output

RF Modulator

RF Output

Video Processor

Video Output

RF Controller

RF Input

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