



# Intel<sup>®</sup> Solid-State Drive Data Center Tool

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*User Guide Version 1.2*



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# 1 Introduction

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The purpose of this guide is to describe how to use the Intel® Solid-State Drive Data Center Tool (Intel SSD Data Center Tool or iSDCT). The tool provides a command line interface for interacting and issuing commands to the Intel® Solid-State Drive 910 Series (Intel SSD 910 Series) drives.

## 1.1 Features

This user guide describes the commands necessary for interacting with Intel SSD 910 drives. The functionality includes:

- Detecting drives and adapters attached on the system.
- Erasing data on the SSD by issuing a SCSI Full Format Unit command.
- Resizing the SSD by changing its max Logical Block Address (LBA).
- Updating the firmware for the SSD
- Issuing SCSI read and write commands to the SSD.
- Reading and parsing SCSI Inquiry pages and Log pages.
- Changing the drives performance by changing the Power Setting configuration.

## 1.2 System Requirements

The tool is supported on the following operating systems:

- Microsoft Windows Server\* 2008 SP2 / R2
- Microsoft Windows Server\* 2003
- Microsoft Windows\* 7
- Red Hat Enterprise Linux (RHEL) 5.5, 5.6, 6.0, and 6.1
- SUSE 11

**NOTE:** On Microsoft Windows\* 7, and Server 2008/R2, administrator access is required via one of the following methods:

- Open a command prompt as administrator and run the tool via the commands listed below.
- Disable User Account Control (UAC) where applicable and run the tool by running it in a command prompt.

**NOTE:** On Linux systems, the tool must run with root privileges. This can be done through either *sudo* or *su* commands.

## 1.3 Known Issues

There are currently no known issues with this tool.



## 2 Command Line Options

The Intel SSD Data Center Tool uses a Command Line Interface (CLI). Below is a table of the available command line options, and following the table is a detailed description of each option. Alternatively, the tool can be run without any options to display the table. For the purposes of illustration, the name of the tool for all examples will be "iSDCT.exe" to simplify documentation.

Option	Arguments	Description	Used With
<a href="#">-help</a>	NA	Display the command line options table.	NA
<a href="#">-list</a>	NA	Scan the system for attached drives and adapters, and display the results.	NA
<a href="#">-force</a>	NA	Used to bypass the user prompt.	-firmware_update, -erase, -power_setting
<a href="#">-filename</a>	[name of the file]	Used to save data to a file.	-log, -inquiry, -read
<a href="#">-verbose</a>	NA	Used to print a more detailed inquiry or log page data table.	-inquiry, -log
<a href="#">-verify</a>	[pattern]	Used to verify the data read back from -read command against a known data pattern.	-read
<a href="#">-seed</a>	[num]	Used to set the seed value for the random number generator.	-write, -verify
<a href="#">-device</a>	[index num]	Used to select which attached PCIe SSD device to execute functions on.	-firmware_update, -power_setting
<a href="#">-firmware_update</a>	NA	Used to update the selected Device's firmware. The firmware used for this feature is embedded within the tool. No binary file used. When the command runs, both the PCIe to SAS Controller and all SSDs are updated as needed.  <b>NOTE: Using any other software tool and binary file besides the iSDCT.EXE tool to update the PCIe to SAS controller firmware will render the drive useless and void the warranty. There is no recovery after loading a non-authorized PCIe to SAS controller firmware.</b>	-device
<a href="#">-power_setting</a>	[setting]	Change the device's power setting. Given setting can be either: Default, or max_performance.  NOTE: The max_performance configuration requires strict host capabilities. See Section 2.10 for details.	-device



<a href="#">-drive</a>	[index num   "all" ]	Used to select which attached drive to execute functions on.	-inquiry, -log, -erase, -resize, -read, -write
<a href="#">-inquiry</a>	[page code(s)   "all"   NULL]	Used to read and parse SCSI inquiry pages.	-drive
<a href="#">-log</a>	[page code(s)   "all"   NULL]	Used to read and parse SCSI log pages.	-drive
<a href="#">-erase</a>	NA	Used to issue a full SCSI format unit command.  NOTE: This operation can take as long as 20 minutes to complete.	-drive, -drive [all]
<a href="#">-resize</a>	[Max LBA]	Used to set the drives max LBA value.	-drive
<a href="#">-read</a>	[LBA] [blockcount]	Used to issue a SCSI read 12 command	-drive
<a href="#">-write</a>	[LBA] [blockcount] [pattern]	Used to issue a SCSI write 12 command	-drive



## 2.1 -help

<b>Description:</b>	Display the command line options table. This option takes precedence over all others. All other arguments will be ignored.
<b>Arguments:</b>	None.
<b>Used with:</b>	None.
<b>Usage:</b>	iSDCT.exe -help. See example: <a href="#">Display Tool Help</a>

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## 2.2 -list

<b>Description:</b>	Scan the system for attached PCIe devices and associated drives, and display the results. All other arguments will be ignored. Drives associated with an adapter will be displayed below their adapter. Use this option to see the PCIe device and drive indexes which are used by - device -drive.
<b>Arguments:</b>	None.
<b>Used with:</b>	None.
<b>Usage:</b>	iSDCT.exe -list. See example: <a href="#">Display PCIe Devices and Drives</a>

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## 2.3 -force

<b>Description:</b>	-force is used to bypass the user prompt.
<b>Arguments:</b>	None.
<b>Used with:</b>	<a href="#">-firmware update</a> , <a href="#">-erase</a> , <a href="#">-power setting</a>
<b>Usage:</b>	See example: <a href="#">By-pass Prompt</a>

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## 2.4 -filename [name of the file]

<b>Description:</b>	The -filename option is used when data needs to be stored to a file. Currently used by -log and -inquiry to save .CSV files of the requested data. Also used by -read to save a binary file of the data read from the drive.					
<b>Arguments:</b>	<table border="1"> <thead> <tr> <th>Argument</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>[name of the file]</td> <td>A valid filename and path.</td> </tr> </tbody> </table>		Argument	Description	[name of the file]	A valid filename and path.
Argument	Description					
[name of the file]	A valid filename and path.					
<b>Used with:</b>	<a href="#">-log</a> , <a href="#">-inquiry</a> , <a href="#">-read</a>					
<b>Usage:</b>	See example: <a href="#">Saving Data from the Drive</a>					

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## 2.5 -verbose

<b>Description:</b>	-verbose is used to print a more detailed inquiry or log page data table.
<b>Arguments:</b>	None.
<b>Used with:</b>	<a href="#">-log</a> , <a href="#">-inquiry</a>
<b>Usage:</b>	iSDCT.exe -drive X -inquiry 0x03 -verbose. See example: <a href="#">Verbose Inquiry and Log Data</a>

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## 2.6 -verify [pattern]

<b>Description:</b>	-verify is used to verify the data read back from -read command against a known data pattern.					
<b>Arguments:</b>	<table border="1"> <thead> <tr> <th>Argument</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>[pattern]</td> <td>Pattern can be a valid hex value; for example, 0xC5. Pattern can also be "rand" if there is a need to use random data based off a seed.</td> </tr> </tbody> </table>		Argument	Description	[pattern]	Pattern can be a valid hex value; for example, 0xC5. Pattern can also be "rand" if there is a need to use random data based off a seed.
Argument	Description					
[pattern]	Pattern can be a valid hex value; for example, 0xC5. Pattern can also be "rand" if there is a need to use random data based off a seed.					
<b>Used with:</b>	<a href="#">-read</a> , <a href="#">-seed</a>					
<b>Usage:</b>	iSDCT.exe -device Y -drive X -read 0 1 -verify 0xC5. See example: <a href="#">Verify Data Read</a>					

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## 2.7 -seed [num]

<b>Description:</b>	<p>-seed is used to set the seed value for the random number generator.</p> <p>Use this command with a "rand" pattern for either -write or -verify. The seed value will default to 0 if -seed is not used. -seed will be ignored if "rand" is not used for the pattern of -write and -verify.</p>				
<b>Arguments:</b>	<table border="1"><thead><tr><th><b>Argument</b></th><th><b>Description</b></th></tr></thead><tbody><tr><td>[num]</td><td>The numeric value to set the seed to.</td></tr></tbody></table>	<b>Argument</b>	<b>Description</b>	[num]	The numeric value to set the seed to.
<b>Argument</b>	<b>Description</b>				
[num]	The numeric value to set the seed to.				
<b>Used with:</b>	<a href="#">-write</a> , <a href="#">-verify</a>				
<b>Usage:</b>	iSDCT.exe -device Y -drive X -write 0 2 rand -seed 44. See example: <a href="#">Set Random Seed</a>				

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## 2.8 -device [num]

<b>Description:</b>	<p>-device is used to select which attached PCIe device to execute functions on.</p> <p>Run -list to see the PCIe device indexes for each attached drive.</p> <p>Detailed information about the specific PCIe device will be displayed when used with no additional options. Additional information includes the PCIe device link status and the drives associated with the PCIe device.</p>				
<b>Arguments:</b>	<table border="1"><thead><tr><th><b>Argument</b></th><th><b>Description</b></th></tr></thead><tbody><tr><td>[num]</td><td>The numeric value corresponds to the PCIe Device index from: -list.</td></tr></tbody></table>	<b>Argument</b>	<b>Description</b>	[num]	The numeric value corresponds to the PCIe Device index from: -list.
<b>Argument</b>	<b>Description</b>				
[num]	The numeric value corresponds to the PCIe Device index from: -list.				
<b>Used with:</b>	<a href="#">-firmware update</a> , <a href="#">-power setting</a> , <a href="#">-drive</a>				
<b>Usage:</b>	iSDCT.exe -device 0. See example: <a href="#">Display PCIe Device Info</a>				

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## 2.9 -firmware\_update

<b>Description:</b>	<p>-firmware_update is used to update the selected PCIe device's firmware as well as each associated drive's firmware.</p> <p><b>Note: The Intel SSD Data Center Tool uses embedded firmware. No binary file is required.</b></p> <p>This command will update either / or both the PCIe controller firmware as well as the target SSD firmware as needed.</p> <p>If -force is not used then the user will be prompted whether or not to continue the command.</p>
<b>Arguments:</b>	None.
<b>Used with:</b>	<a href="#">-device</a>
<b>Usage:</b>	iSDCT.exe -device X. See example: <a href="#">Firmware Update</a>

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## 2.10 -power\_setting [default|max\_performance]

<b>Description:</b>	<p>-power_setting is used to change the Intel SSD 910 Series drive power configuration.</p> <p><b>NOTE (1): Changing the power setting could damage the drive! Ensure the host system can meet the <u>300 LFM</u> and <u>28W</u> average power and <u>38W</u> peak power to the PCIe slot the drive is located, before changing from default power setting.</b></p> <p><b>NOTE (2): Only the 800GB SKU Drive is configurable and this setting is above and beyond data sheet specifications.</b></p> <p>If -force is not used then the user will be prompted whether or not to continue the command.</p>					
<b>Arguments:</b>	<table border="1"> <thead> <tr> <th><u>Argument</u></th> <th><u>Description</u></th> </tr> </thead> <tbody> <tr> <td>[default   max_performance]</td> <td>Set the power configuration to the given setting.</td> </tr> </tbody> </table>		<u>Argument</u>	<u>Description</u>	[default   max_performance]	Set the power configuration to the given setting.
<u>Argument</u>	<u>Description</u>					
[default   max_performance]	Set the power configuration to the given setting.					
<b>Used with:</b>	<a href="#">-device</a>					
<b>Usage:</b>	iSDCT.exe -device X -power_setting max_performance.					

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## 2.11 -drive [num | "all"]

<b>Description:</b>	<p>-drive is used to select which attached drive to execute functions on.</p> <p>Run -list to see the drive indexes for each attached drive.</p> <p>Basic drive information will be displayed if no additional options are used.</p>							
<b>Arguments:</b>	<table border="1"><thead><tr><th><b>Argument</b></th><th><b>Description</b></th></tr></thead><tbody><tr><td>[num]</td><td>The numeric value corresponds to the drive index from -list.</td></tr><tr><td>["all"]</td><td>"all" can be used to iterate functionality across all attached drives. <b>Use caution when using the "all" argument as every one of the drives associated with the PCIe device will be affected by the command.</b></td></tr></tbody></table>		<b>Argument</b>	<b>Description</b>	[num]	The numeric value corresponds to the drive index from -list.	["all"]	"all" can be used to iterate functionality across all attached drives. <b>Use caution when using the "all" argument as every one of the drives associated with the PCIe device will be affected by the command.</b>
<b>Argument</b>	<b>Description</b>							
[num]	The numeric value corresponds to the drive index from -list.							
["all"]	"all" can be used to iterate functionality across all attached drives. <b>Use caution when using the "all" argument as every one of the drives associated with the PCIe device will be affected by the command.</b>							
<b>Used with:</b>	<a href="#">-inquiry</a> , <a href="#">-log</a> , <a href="#">-erase</a> , <a href="#">-resize</a> , <a href="#">-read</a> , <a href="#">-write</a>							
<b>Usage:</b>	iSDCT.exe -device Y -drive X. See example: <a href="#">Display Drive Info</a>							

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## 2.12 -inquiry [page code(s) | "all" | NULL]

<b>Description:</b>	<p>-inquiry is used to read and parse SCSI inquiry pages from the selected drive.</p> <p>Use page code of 0x00 to print a list of supported pages.</p>							
<b>Arguments:</b>	<table border="1"><thead><tr><th><b>Argument</b></th><th><b>Description</b></th></tr></thead><tbody><tr><td>[page code(s)]</td><td>This argument is <b>optional</b>. If no page code is given then the standard SCIS inquiry page will be parsed. It is possible to provide it with one or more page codes to parse.</td></tr><tr><td>["all"]</td><td>If the "all" is used, then all supported inquiry pages will be parsed</td></tr></tbody></table> <p>Note: page code arguments are hex values of the page code. I.E. 0x03, 0x00, etc.</p>		<b>Argument</b>	<b>Description</b>	[page code(s)]	This argument is <b>optional</b> . If no page code is given then the standard SCIS inquiry page will be parsed. It is possible to provide it with one or more page codes to parse.	["all"]	If the "all" is used, then all supported inquiry pages will be parsed
<b>Argument</b>	<b>Description</b>							
[page code(s)]	This argument is <b>optional</b> . If no page code is given then the standard SCIS inquiry page will be parsed. It is possible to provide it with one or more page codes to parse.							
["all"]	If the "all" is used, then all supported inquiry pages will be parsed							
<b>Used with:</b>	<a href="#">-drive</a>							
<b>Usage:</b>	iSDCT.exe -device Y -drive X -inquiry 0x00 0x03. See example: <a href="#">SCSI Inquiry</a>							

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## 2.13 -log [page code(s) | "all" | NULL]

<b>Description:</b>	-log is used to read and parse SCSI log pages from the selected drive. Use page code 0x00 to print a list of supported pages.							
<b>Arguments:</b>	<table border="1"> <thead> <tr> <th>Argument</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>[page code(s)]</td> <td>This argument is <b>optional</b>. If no page code is given then the page code 0x00 will be parsed. It is possible to provide it with one or more page codes to parse.</td> </tr> <tr> <td>["all"]</td> <td>If the "all" option is used, then all supported inquiry pages will be parsed</td> </tr> </tbody> </table> <p>Note: page code arguments are hex values of the page code. I.E. 0x03, 0x00, etc.</p>		Argument	Description	[page code(s)]	This argument is <b>optional</b> . If no page code is given then the page code 0x00 will be parsed. It is possible to provide it with one or more page codes to parse.	["all"]	If the "all" option is used, then all supported inquiry pages will be parsed
Argument	Description							
[page code(s)]	This argument is <b>optional</b> . If no page code is given then the page code 0x00 will be parsed. It is possible to provide it with one or more page codes to parse.							
["all"]	If the "all" option is used, then all supported inquiry pages will be parsed							
<b>Used with:</b>	<a href="#">-drive</a>							
<b>Usage:</b>	iSDCT.exe -device Y -drive X -log. See example: <a href="#">SCSI Log Page</a>							

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## 2.14 -erase

<b>Description:</b>	-erase is used to issue a SCSI full format unit to the selected drive and erase all data. NOTE: This command will take at least 20 minutes to complete the erasure of data on the drive specified.  If -force is not used then the user will be prompted whether or not to continue the command.							
<b>Arguments:</b>	None.							
<b>Errors</b>	<table border="1"> <thead> <tr> <th>Error Code</th> <th>Text Description</th> </tr> </thead> <tbody> <tr> <td>81</td> <td>Command was cancelled by the user.</td> </tr> <tr> <td>215</td> <td>ERROR: Failed to erase the drive.</td> </tr> </tbody> </table>		Error Code	Text Description	81	Command was cancelled by the user.	215	ERROR: Failed to erase the drive.
Error Code	Text Description							
81	Command was cancelled by the user.							
215	ERROR: Failed to erase the drive.							
<b>Used with:</b>	<a href="#">-drive</a>							
<b>Usage:</b>	iSDCT.exe -device Y -drive X -erase. See example: <a href="#">SCSI Full Format Unit</a>							

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## 2.15 -resize [max LBA]

<b>Description:</b>	-resize is used to set the drives max LBA value.					
<b>Arguments:</b>	<table border="1"><thead><tr><th>Argument</th><th>Description</th></tr></thead><tbody><tr><td>[max LBA]</td><td>The numeric value to set the max LBA to.</td></tr></tbody></table>		Argument	Description	[max LBA]	The numeric value to set the max LBA to.
Argument	Description					
[max LBA]	The numeric value to set the max LBA to.					
<b>Used with:</b>	<a href="#">-drive</a>					
<b>Usage:</b>	iSDCT.exe -device Y -drive X -resize 2195555. See example: <a href="#">Set Max Address</a>					

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## 2.16 -read [LBA] [Blockcount]

<b>Description:</b>	<p>-read is used to issue a "SCSI Read 12" command to the drive.</p> <p>Use -filename to save a binary file of the data read.</p> <p>Use -verify to verify the data read against a given pattern.</p>							
<b>Arguments:</b>	<table border="1"><thead><tr><th>Argument</th><th>Description</th></tr></thead><tbody><tr><td>[LBA]</td><td>Start the read from this given LBA.</td></tr><tr><td>[Blockcount]</td><td>Number of blocks to read from the drive.</td></tr></tbody></table> <p>Note: LBA and Blockcount are both number values.</p>		Argument	Description	[LBA]	Start the read from this given LBA.	[Blockcount]	Number of blocks to read from the drive.
Argument	Description							
[LBA]	Start the read from this given LBA.							
[Blockcount]	Number of blocks to read from the drive.							
<b>Used with:</b>	<a href="#">-drive</a>							
<b>Usage:</b>	iSDCT.exe -device Y -drive X -read 0 2. See example: <a href="#">SCSI Read</a>							

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## 2.17 -write [LBA] [Blockcount] [pattern]

<b>Description:</b>	-write is used to issue a "SCSI Write 12" command to the drive.									
<b>Arguments:</b>	<table border="1"> <thead> <tr> <th><b>Argument</b></th> <th><b>Description</b></th> </tr> </thead> <tbody> <tr> <td>[LBA]</td> <td>Start writing to the drive at this given LBA.</td> </tr> <tr> <td>[Blockcount]</td> <td>Number of blocks to write to the drive.</td> </tr> <tr> <td>[pattern]</td> <td> <p>pattern is either the hex byte pattern desired to be written, or it is a "rand" to write random data.</p> <p>When using "rand" as the pattern, use -seed to change the seed value of the random number generator.</p> </td> </tr> </tbody> </table>		<b>Argument</b>	<b>Description</b>	[LBA]	Start writing to the drive at this given LBA.	[Blockcount]	Number of blocks to write to the drive.	[pattern]	<p>pattern is either the hex byte pattern desired to be written, or it is a "rand" to write random data.</p> <p>When using "rand" as the pattern, use -seed to change the seed value of the random number generator.</p>
<b>Argument</b>	<b>Description</b>									
[LBA]	Start writing to the drive at this given LBA.									
[Blockcount]	Number of blocks to write to the drive.									
[pattern]	<p>pattern is either the hex byte pattern desired to be written, or it is a "rand" to write random data.</p> <p>When using "rand" as the pattern, use -seed to change the seed value of the random number generator.</p>									
<b>Used with:</b>	<a href="#">-drive</a>									
<b>Usage:</b>	iSDCT.exe -device Y -drive X -write 0 2 0xAB. See example: <a href="#">SCSI Write</a>									

[Return to Command Line Options](#)



### 3 Error Codes

Below is a table of possible error and status codes returned from the tool. The first column lists the numeric value of the error/status code. This is the value returned by the tool. The second column lists a description for each error/status. For Microsoft Windows\*, typing the following in the command prompt after running the tool displays the numeric Error/Status Code:

```
echo %errorlevel%
```

For Linux, using the "\$?" at the command line obtains the same results.

Error/Status Code	Description
4	ERROR: Failed to open the drive.
11	ERROR: Read-verify failed with given pattern.
18	Firmware is up to date.
66	The Intel SSD has pre-production firmware. Please contact Intel Customer Support for further assistance at the following website: <a href="http://www.intel.com/go/ssdsupport">http://www.intel.com/go/ssdsupport</a> .
67	The Intel SSD has unsupported firmware. Please contact Intel Customer Support for further assistance at the following website: <a href="http://www.intel.com/go/ssdsupport">http://www.intel.com/go/ssdsupport</a> .
73	ERROR: Invalid arguments provided. Run -help to see usage examples.
81	Command was cancelled by the user.
87	ERROR: Invalid drive index given. Use -scan to see the correct values for drive index.
202	ERROR: Given verify pattern value is not a valid hex value or 'rand'.
203	Read-verify successful
205	ERROR: Invalid SKU. Power Setting can only be changed on 800GB SKU.
206	ERROR: Invalid power setting given. Must be either 'default' or 'max_performance'.
207	ERROR: Invalid PCIe Device index.
208	ERROR: PCIe Device failed to open.



<b>210</b>	ERROR: Failed to write the file. (When -filename is used)
<b>211</b>	ERROR: SCSI mode sense command failed.
<b>212</b>	ERROR: SCSI mode select command failed.
<b>213</b>	ERROR: Failed to read SCSI log page.
<b>214</b>	ERROR: SCSI Inquiry command failed.
<b>215</b>	ERROR: Failed to erase the drive.
<b>216</b>	ERROR: Firmware update failed.
<b>217</b>	ERROR: Invalid inquiry page code given.
<b>218</b>	ERROR: Invalid log page code given.
<b>220</b>	ERROR: Given LBA and blockcount values will go beyond the drive's Max LBA.
<b>221</b>	ERROR: Invalid arguments were given for a read operation. Need [LBA] [blockcount]. [LBA] and [blockcount] need to be numeric.
<b>222</b>	ERROR: Invalid arguments were given for a write operation. Need [LBA] [blockcount] [pattern]. [LBA] and [blockcount] need to be numeric.
<b>224</b>	ERROR: Given Max LBA must be greater than 0.
<b>226</b>	ERROR: SCSI Read command failed.
<b>227</b>	ERROR: SCSI Write command failed.
<b>242</b>	ERROR: Failed to validate firmware download.
<b>245</b>	ERROR: Failed to reset adapter.
<b>247</b>	ERROR: PCIe firmware download failed.



## 4 Examples

### 4.1 Display Tool Help

The help table can be displayed by using the `-help` command line option:

#### iSDCT.exe -help

Argument	Description
<code>-help</code>	Display the help string and exit. All other arguments will be ignored. Example: <code>isdct.exe -help</code>
<code>-list</code>	Display a list of attached PCIe Devices and Drives. All other arguments will be ignored. Example: <code>isdct.exe -list</code>
<code>-force</code>	Bypass all the user prompts. Example: <code>isdct.exe -device 0 -drive 1 -erase -force</code>
<code>-filename [X]</code>	Use in conjunction with <code>-inquiry -log</code> and <code>-read</code> . Saves the parsed data to a CSV file if used with <code>-inquiry</code> and <code>-log</code> . Saves a binary file with data read if used with <code>-read</code> . X must be a valid file path and name. Example: <code>isdct.exe -device 0 -drive 1 -log 0x00 0x2F -filename logData.csv</code>
<code>-verbose</code>	Use in conjunction with <code>-inquiry</code> and <code>-log</code> . Increases the verbosity of the printed structures. Example: <code>isdct.exe -device 0 -drive 1 -inquiry -verbose</code>
<code>-verify [X]</code>	Use in conjunction with <code>-read</code> . Verifies the data read against the given byte pattern X. X must be a valid hex value. Or <code>rand</code> if using random data. Example: <code>isdct.exe -device 0 -drive 1 -read 0 256 -verify 0xA0A</code>
<code>-seed [X]</code>	Set the seed value of the random generator to the given value. Used in conjunction with <code>-write</code> and <code>-read</code> with <code>-verify</code> when <code>rand</code> pattern is used. Example: <code>isdct.exe -device 0 -drive 1 -write 0 256 rand -seed 2</code>
<code>-device [X]</code>	Use to select a specific PCIe Device to interact with. X must be a valid PCIe Device index number. Run with no additional parameters to display more information about the device. Run <code>-list</code> to see attached devices and drives. Example: <code>isdct.exe -device 0</code>
<code>-firmware_update</code>	Update the firmware of the given PCIe Device. Example: <code>isdct.exe -device 0 -firmware_update</code>
<code>-power_setting [X]</code>	Use to set the given PCIe Device's performance setting. Only supported on 800GB SKUs. [X] must be a valid power setting: <code>default</code> or <code>max_performance</code> . To use this setting host system must support 300 LFM and both 28W average and 38W peak to the PCIe slot. Example: <code>isdct.exe -device 0 -power_setting max_performance</code>
<code>-drive [X]</code>	Use to select a specific drive of the selected PCIe Device to interact with. X must be a valid drive index number. If X is 'all' then functionality will be iterated through all drives of the selected PCIe Device. Run <code>-list</code> to see the selected PCIe Device's attached drives. Example: <code>isdct.exe -device 0 -drive 1</code>
<code>-inquiry [page code]</code>	Parse the given inquiry page code data from the <code>-drive</code> . If no page code is given then the standard SCSI inquiry data is parsed. Page code can be a list of one or more valid page codes. Use Page Code = <code>0x00</code> to display the list of supported page codes. Use 'all' for the page number to parse all inquiry pages. Use <code>-verbose</code> to return more detailed information. Use <code>-filename</code> to save output to a file. Example: <code>isdct.exe -device 0 -drive 1 -inquiry 0x0</code>
<code>-log [page code]</code>	Parse the given log page code data from the given <code>-drive</code> . If no page code is given then the supported log pages will be displayed. Page code can be a list of one or more valid page codes. Use 'all' for the page code to parse all log pages. Use <code>-verbose</code> to return more detailed information. Use <code>-filename</code> to save CSV output to a file. Example: <code>isdct.exe -device 0 -drive 1 -log</code>
<code>-erase</code>	Erase all the data on the drive by issuing a SCSI Format Unit command. Prompts the user for confirmation. Use <code>-force</code> to bypass prompt. Use <code>-drive all</code> to erase all the target drives in parallel. Note: Erasing the drive could take over 20 minutes to complete. Example: <code>isdct.exe -device 0 -drive 1 -erase</code>
<code>-resize [MaxLBA]</code>	Set the <code>-drive's</code> maximum LBA to the given value. Example: <code>isdct.exe -device 0 -drive 1 -resize 0x12345678</code>
<code>-read [LBA] [blockcount]</code>	Read the given number of blocks starting from the given LBA. Use <code>-filename</code> to save the binary data to a file. Example: <code>isdct.exe -device 0 -drive 1 -read 0 256 -filename readData.bin</code>
<code>-write [LBA] [blockcount] [pattern]</code>	Write the given pattern and the given number of blocks starting from the given LBA. Example: <code>isdct.exe -device 0 -drive 1 -write 0 256 0xA0A</code>



It will also be displayed when no command line options are used:

```
iSDCT.exe
```

## 4.2 Display PCIe Devices and Drives

The `-list` option will display a list of detected PCIe devices and drives:

```
iSDCT.exe -list
```

```

PCIe Device Index | Port | Product Name | Power Setting
-----
0 | Scsi Port 2 | Intel(R) SSD 910 | Default

Drive Index | Model | Serial Number | Max LBA | Sector Size | SAS Address | Phy Num | Test Unit | Firmware
-----
0 | INTEL(R) SSD 910 200GB | XU005SNB | 390721967 | 512 | 5000CCA013005689 | 3 | Ready | 1200C008A40D
1 | INTEL(R) SSD 910 200GB | XU005SPB | 390721967 | 512 | 5000CCA01300568E | 5 | Ready | 1200C008A40D

```

## 4.3 By-pass Prompt

The `-force` option is used to bypass the confirmation prompt for `-firmware_update`, `-erase` and `-power_setting`.

## 4.4 Saving Data from the Drive

`-filename` option can be used with `-inquiry` and `-log` to save off a .CSV file of the requested data. See `-inquiry` examples and `-log` examples for more details. It can also be used with `-read` to save a binary file of the data read. See `-read` examples for more details.

## 4.5 Verbose Inquiry and Log Data

`-verbose` can be used with `-log` and `-inquiry` to print a more detailed data table of the requested data. See `-log` examples and `-inquiry` examples for more details.

## 4.6 Verify Data Read

`-verify` can be used with `-read` to verify the data read against a given pattern. See `-read` examples for more details.



### 4.7 Set Random Seed

-seed can be used with -write and -verify when using a "rand" pattern. See -write examples and -read examples for more details.

### 4.8 Display Drive Info

-drive option is used to select a drive via drive index (see -list) to execute functions on. Additionally, use -drive by itself (no other options) to print out the basic drive information on a single drive:

```
iSDCT.exe -device 0 -drive 1
```

Device Index	Drive Index	Model	Serial Number	Max LBA	Sector Size	SAS Address	Phy Num	Test Unit	Firmware
0	1	INTEL(R) SSD 910 200GB	XUU05SPB	390721967	512	5000CCA01300568E	5	Ready	1200C000A40D

SUCCESS

Or on all the drives:

```
iSDCT.exe -device 0 -drive all
```

0	0	INTEL(R) SSD 910 200GB	XUU05SNB	390721967	512	5000CCA013005689	3	Ready	1200C000A40D
---	---	------------------------	----------	-----------	-----	------------------	---	-------	--------------

SUCCESS

0	1	INTEL(R) SSD 910 200GB	XUU05SPB	390721967	512	5000CCA01300568E	5	Ready	1200C000A40D
---	---	------------------------	----------	-----------	-----	------------------	---	-------	--------------

SUCCESS

### 4.9 Display PCIe Device Info

Similar to -drive, -device is used to select an adapter to execute functions on. Also use -device by itself (no other command line options) to print out detailed information about the PCIe Device:



### iSDCT.exe -device 0

```

PCIe Device Index | Port | Product Name | Serial Number | Power Setting
-----
| 0 | Scsi Port 2 | Intel(R) SSD 910 | CURD21220008400CGN | Default

Drive Index | Model | Serial Number | Max LBA | Sector Size | SAS Address | Phy Num | Test Unit | Firmware
-----
| 0 | INTEL(R) SSD 910 200GB | XU005SNB | 390721967 | 512 | 5000CCA013005689 | 3 | Ready | 1200C008A40D
| 1 | INTEL(R) SSD 910 200GB | XU005SPB | 390721967 | 512 | 5000CCA01300568E | 5 | Ready | 1200C008A40D

PCIe Device's Link Status...
Port 0 | Port 1 | Port 2 | Port 3 | Port 4 | Port 5 | Port 6 | Port 7
-----
| off | off | off | 6.0 G | off | 6.0 G | off | off

SUCCESS

```

## 4.10 SCSI Inquiry

-inquiry is used to parse the inquiry pages from the drive. If no arguments are given to -inquiry then the standard SCSI Inquiry structure is parsed:

### iSDCT.exe -device 0 -drive 1 -inquiry

```

Device Index | Drive Index | Model | Serial Number | Max LBA | Sector Size | SAS Address | Phy Num | Test Unit | Firmware
-----
| 0 | 1 | INTEL(R) SSD 910 200GB | XU005SPB | 390721967 | 512 | 5000CCA01300568E | 5 | Ready | 1200C008A40D

Inquiry Page = Standard Inquiry Page
Description | Value
-----
Vendor ID | INTEL(R)
Product ID | SSD 910 200GB
Product Revision Level | a40D
Unit Serial Number | XU005SPB
Copyright Notice | Please contact your Intel field representative.

SUCCESS

```

To parse multiple inquiry pages, provide the -inquiry with a list of one or more page codes (in hex format):

### iSDCT.exe -device 0 -drive 1 -inquiry 0x00 0x03 0x80



```

Device Index | Drive Index | Model | Serial Number | Max LBA | Sector Size | SAS Address | Phy Num | Test Unit | Firmware
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
0 | 1 | INTEL(R) SSD 910 200GB | XU005SPB | 390721967 | 512 | 5000CCA01300568E | 5 | Ready | 1200C000A40D

Supported Page List. Inquiry Page = 0x00
-----|-----
Description | Value
-----|-----
Supported Page List | 0x00
ACSI information - Firmware | 0x03
Unit Serial Number Page | 0x00
Device Identification Page | 0x03
Extended Inquiry Data and Protection Information Page | 0x06
Mode Page Policy Page | 0x07
SCSI Protocol Specific Information | 0x08
Power Condition Page | 0x0A
Protocol Specific Logical Unit Information Page | 0x90
Device Type Specific Information Page | 0xB0
Device Type Specific Information Page | 0xB1
Vendor specific - Board Information | 0xD2

ACSI information - Firmware. Inquiry Page = 0x03
-----|-----
Description | Value
-----|-----
Microcode ID | MLGNA40D
Build Number | 0x00443034
Build Date | Tue Apr 03 14:45:33 2012
Product ID | MLC
Interface ID | SAS
Code Type | EVAL
User Name |
Machine Name |
Directory Name |
Operating State | 0x00000005
Functional Mode | 0x00010007
Degraded Reason | 0x00000000
Broken Reason | 0x00000000
Code Mode | 0x00000002
Microcode Revision | CB1A2016
Context Failure Reason | 0x00000000

Unit Serial Number Page. Inquiry Page = 0x00
-----|-----
Description | Value
-----|-----
Serial Number | XU005SPB

SUCCESS

```

To parse all the inquiry pages, provide the "all" to -inquiry:

```
ISDCT.exe -device 0 -drive 1 -inquiry all
```

Use the -filename command line option to save a .CSV file of the requested inquiry page(s):

```
ISDCT.exe -device 0 -drive 1 -inquiry -filename stdInq.csv
```

```

Device Index | Drive Index | Model | Serial Number | Max LBA | Sector Size | SAS Address | Phy Num | Test Unit | Firmware
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
0 | 1 | INTEL(R) SSD 910 200GB | XU005SPB | 390721967 | 512 | 5000CCA01300568E | 5 | Ready | 1200C000A40D

Successfully saved inquiry data to: stdInq.csv

SUCCESS

```

Use the -verbose command line option to print a more detailed data table of the requested inquiry page(s).

**Note:** Use the -filename option to save more detailed data to the .CSV file as well.



**ISDCT.exe -device 0 -drive 1 -inquiry 0x03 -verbose**

```

Device | Drive | Model | Serial Number | Max LBA | Sector | SAS Address | Phy | Test | Firmware
Index | Index | | | | Size | | Num | Unit |
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
0 | 1 | INTEL(R) SSD 910 200GB | XU005SPB | 390721967 | 512 | 5000CCA01300568E | 5 | Ready | 1200C000A40D

ACSI information - Firmware. Inquiry Page = 0x03
Bytes | Bits | Description | Value
-----|-----|-----|-----
0 | | Peripheral Device Type | 0x00
7:5 | | Qualifier | 0x0
4:0 | | Peripheral Device Type | 0x0
1 | | Page Code | 0x03
2-3 | | Page Length | 0x00CC
4 | | Fields Length | 0x00
5-23 | | Reserved | 0x00000000000000000000000000000000
24-35 | | Microcode ID | MLGNR40D
36-39 | | Reserved | 0x772ED998
40-41 | | Major Version | 0x3461
42-43 | | Minor Version | 0x4430
44-47 | | User Count | 0x00303030
48-51 | | Build Number | 0x00443034
52-79 | | Build Date | Tue Apr 03 14:45:33 2012
80-81 | | Code ID | 0x4408
82-83 | | Compatibility ID | 0xFFFF
84-91 | | Product ID | MLC
92-99 | | Interface ID | SAS
100-107 | | Code Type | EVAL
108-119 | | User Name |
120-135 | | Machine Name |
136-167 | | Directory Name |
168-171 | | Operating State | 0x00000005
172-175 | | Functional Mode | 0x00010007
176-179 | | Degraded Reason | 0x00000000
180-183 | | Broken Reason | 0x00000000
184-187 | | Code Mode | 0x00000002
188-195 | | Microcode Revision | C010Z016
196-199 | | Context Failure Reason | 0x00000000

SUCCESS
    
```

To parse the inquiry page(s) of all drives, use the "all" with the -drive parameter:

**ISDCT.exe -device 0 -drive all -inquiry 0x80**

```

Device | Drive | Model | Serial Number | Max LBA | Sector | SAS Address | Phy | Test | Firmware
Index | Index | | | | Size | | Num | Unit |
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
0 | 0 | INTEL(R) SSD 910 200GB | XU005SNB | 390721967 | 512 | 5000CCA013005689 | 3 | Ready | 1200C000A40D

Unit Serial Number Page. Inquiry Page = 0x80
Description | Value
-----|-----
Serial Number | XU005SNB

SUCCESS

Device | Drive | Model | Serial Number | Max LBA | Sector | SAS Address | Phy | Test | Firmware
Index | Index | | | | Size | | Num | Unit |
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
0 | 1 | INTEL(R) SSD 910 200GB | XU005SPB | 390721967 | 512 | 5000CCA01300568E | 5 | Ready | 1200C000A40D

Unit Serial Number Page. Inquiry Page = 0x80
Description | Value
-----|-----
Serial Number | XU005SPB

SUCCESS
    
```



### 4.11 SCSI Log Page

-log is used to parse the log pages from the drive. If no arguments are specified to the -log command then log page 0x00 will be parsed:

```
iSDCT.exe -device 0 -drive 1 -log
```

```

-----
| Device | Drive | Model | Serial Number | Max LBA | Sector | SAS Address | Phy | Test | Firmware |
| Index | Index | | | | Size | | Num | Unit | |
-----
| 0 | 1 | INTEL(R) SSD 910 200GB | XUU05SPB | 390721967 | 512 | 5000CCA01300560E | 5 | Ready | 1200C000A40D |
-----
Supported Page List. Log Page = 0x00
-----
| Description | Value |
-----
| Supported Page List | 0x00 |
| Write Error Counter | 0x02 |
| Read Error Counter | 0x03 |
| Verify Error Counter | 0x05 |
| Non-medium Error Counter | 0x06 |
| Temperature | 0x0D |
| Manufacturing Date Information | 0x0E |
| Application Client Log | 0x0F |
| Self Test Results | 0x10 |
| Solid State Media | 0x11 |
| Background Scan Medium Operation | 0x15 |
| Protocol Specific Log Parameter | 0x18 |
| Link Status | 0x1A |
| SMART Status and Temperature Reading | 0x2F |
| Vendor Specific | 0x30 |
| Misc Data Counters | 0x37 |
-----
SUCCESS

```

To parse multiple log pages, provide the -log with a list of one or more page codes (in hex format):

```
iSDCT.exe -device 0 -drive 1 -log 0x00 0x03 0x2F
```

It is possible to parse all the inquiry pages by providing "all" to the -log command.

**NOTE: Some of the log structures are big and can produce large files.**

```
iSDCT.exe -device 0 -drive 1 -log all
```

Use the -filename command line option to save a .CSV file of the requested log page(s):

```
iSDCT.exe -device 0 -drive 1 -log 0x2F -filename smartLog.csv
```

Use the -verbose command line option to print a more detailed data table of the requested log page(s).

**Note: The -filename option can be used to save the more detailed data to .CSV:**



```
iSDCT.exe -device 0 -drive 1 -log 0x2F -verbose
```

To parse the inquiry page(s) of all drives use "all" with the -drive parameter:

```
iSDCT.exe -device 0 -drive all -log 0x2F
```

## 4.12 SCSI Full Format Unit

-erase option is used to issue a SCSI Format Unit command and erase all the data on the drive.

**Note: the full format takes at least 20 minutes to complete for a single drive**

```
iSDCT.exe -device 0 -drive 1 -erase
```

```

: Device : Drive : Model          : Serial Number : Max LBA  : Sector : SAS Address      : Phy : Test : Firmware
: Index  : Index  :              :               :          : Size   :                 : Num  : Unit :
-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: 0      : 0      : INTEL(R) SSD 910 200GB : XU083B6C     : 398721967 : 512    : 5000CCA013003279 : 0    : Ready : 1280D006A411
:
WARNING! Format will erase all the data on drive 0!
Note: Erasing the drive could take over 20 minutes to complete.
Proceed with format? <Y|N>: n
Command was cancelled by the user.

```

To bypass the user prompt use the -force option:

```
iSDCT.exe -device 0 -drive 1 -erase -force
```

The Format Unit command can also be used erase all the target drives in parallel, enabling the erasure of all target drives in the same amount of time it would take to erase a single drive. To erase all target drives at the same time, issue the following command:

```
isdct.exe -device 0 -drive all -erase
```

```

WARNING! Format will erase all the data on all drives!
WARNING! All drives will be erased in parallel!
Note: Erasing the drive could take over 20 minutes to complete.
Proceed with format? <Y|N>: n
Command was cancelled by the user.

```



### 4.13 Set Max Address

-resize is used to change the drive's max LBA:

```
iSDCT.exe -device 0 -drive 1 -resize 150000000
```

Device Index	Drive Index	Model	Serial Number	Max LBA	Sector Size	SAS Address	Phy Num	Test Unit	Firmware
0	1	INTEL(R) SSD 910 200GB	XUU05SPB	390721967	512	5000CCA01300568E	5	Ready	1200C008A40D

SUCCESS

Device Index	Drive Index	Model	Serial Number	Max LBA	Sector Size	SAS Address	Phy Num	Test Unit	Firmware
0	1	INTEL(R) SSD 910 200GB	XUU05SPB	150000000	512	5000CCA01300568E	5	Ready	1200C008A40D

SUCCESS

If the given LBA is over the drives physical maximum, an error is returned:

```
iSDCT.exe -device 0 -drive 1 -resize 999999999
```

Device Index	Drive Index	Model	Serial Number	Max LBA	Sector Size	SAS Address	Phy Num	Test Unit	Firmware
0	1	INTEL(R) SSD 910 200GB	XUU05SPB	390721967	512	5000CCA01300568E	5	Ready	1200C008A40D

ERROR: SCSI mode select command failed.

### 4.14 SCSI Read

-read option is used to read a chunk of data off the drive. For example, to read 5 blocks starting from LBA 10 do the following:

```
iSDCT.exe -device 0 -drive 1 -read 10 5
```

To save a binary file of the data that is read by using the -filename option:

```
iSDCT.exe -device 0 -drive 1 -read 10 5 -filename readData.bin
```

Use the -verify option to check the data that is read against a given pattern. For example, a sector of 0xA5 is written to LBA 3 (see the write example below), to read back what was written and verify it:



```
iSDCT.exe -device 0 -drive 1 -read 3 1 -verify 0xA5
```

```
-----
| Device | Drive | Model          | Serial Number | Max LBA | Sector | SAS Address | Phy | Test | Firmware |
| Index | Index |                |               |         | Size   |             | Num | Unit |           |
-----
| 0      | 1     | INTEL(R) SSD 910 200GB | XU005SPB     | 390721967 | 512    | 5000CCA01300568E | 5   | Ready | 1200C000A40D |
-----
Read-verify successful!
```

If a different pattern is provided, the verify command will fail:

```
-----
| Device | Drive | Model          | Serial Number | Max LBA | Sector | SAS Address | Phy | Test | Firmware |
| Index | Index |                |               |         | Size   |             | Num | Unit |           |
-----
| 0      | 1     | INTEL(R) SSD 910 200GB | XU005SPB     | 390721967 | 512    | 5000CCA01300568E | 5   | Ready | 1200C000A40D |
-----
ERROR: Read-verify failed with given pattern.
```

If random data was written to the drive, use the "rand" with -verify to check the correct data pattern. The default seed value is 0. Use -seed to change it:

```
iSDCT.exe -device 0 -drive 1 -read 3 1 -verify rand
```

If a different seed value is used to verify than what was used to write with, then the verify command will fail because the write used different random data than the verify:

```
iSDCT.exe -device 0 -drive 1 -read 3 1 -verify rand -seed 1
```

## 4.15 SCSI Write

-write is used to write data patterns to the drive. For example, to write the byte pattern 0xA5 to LBA 1, do the following:

```
iSDCT.exe -device 0 -drive 1 -write 3 1 0xA5
```

The pattern written can also be random data. Instead of using 0xA5, add "rand" for the data.

```
iSDCT.exe -device 0 -drive 1 -write 3 1 rand
```

To change the seed value, use the -seed option:

```
iSDCT.exe -device 0 -drive 1 -write 3 1 rand -seed 4
```



## 4.16 Firmware Update

-firmware\_update is used to update the firmware of the Intel SSD 910 Series. This function uses an embedded firmware file. It only allows the update embedded within the tool. No firmware binary is required.

```
iSDCT.exe -device 0 -drive 1 -firmware_update
```

## 4.17 Change Power Setting

-power\_setting is used to change the device's power setting. The two options available are 'default' and 'max\_performance.'

**NOTE: This feature is only supported on 800GB SKUs**

When used, this function prompts the user for confirmation of the power setting change before proceeding. This prompt is required to verify that host system requirements (300 LFM, 28W average and 38W peak) are present because a change to max\_performance without host requirements being met could potentially damage the drive.

```
iSDCT.exe -device 0 -power_setting max_performance
```

```
Changing power setting to: MAX_PERFORMANCE
WARNING! You have selected to change the PCIe Devices power setting!
To use this setting host system must support 300 LFM
and both 28W Avg and 38W peak to the PCIe slot.

Proceed with the change? (Y|N): n
Command was cancelled by the user.
```



## 5 Firmware Mapping Table

Below is the firmware mapping table used by the tool. This table describes what the tool does when it encounters drives with different firmware revisions.

The current embedded released firmware is **1200D006A424** and **1200C008A424**.

<i><b>Current Firmware</b></i>	<i><b>Expected Result</b></i>
1200D006A411 or 1200C008A411	Firmware is already up-to-date. No update is performed.
1200D006A40D	Update to 1200D006A424
1200C008A40D	Update to 1200C008A424
1200D006AXXX or 1200C008AXXX where XXX < 40D	Firmware is pre-production. No update is performed.
1000D005AXXX or 1000C007XXX	Firmware is pre-production. No update is performed.
Is <b>NOT</b> 1200D006 or 1200C008 (different LSI firmware)	Firmware is unsupported. No updated is performed.



## Revision History

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Document Number	Revision Number	Description	Revision Date
327191-001	1.0	Initial Release	4/12/2012
327191-002	1.1	Updated –erase (SCSI Full Format Unit) command	10/2/2012
327191-003	1.2	Updated – new firmware versions	07/18/2013