

1 Firmware Description

1.1 INSTEON Commands Supported

1.1.1 Standard length common INSTEON commands:

Assign to ALL-Link Group Command

Description: Sent when holding down the SET Button for 3 seconds on the device. Blinks the LED green for 4 minutes or until linked to another device.

Example (Hex): AA BB CC 01 0E XX CF 01 01 (where AA.BB.CC is the Device's ID)

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
Assign to ALL-Link Group	From Device	Device's ID	0x01, 0x0E, 0xXX (firmware revision)	Broadcast	0x01	0x01	Sent when holding down SET Button for 3 seconds. Group number for OutletLinc Dimmer DB load is 0x01

Delete from ALL-Link Group Command

Description: Sent when holding down the SET Button for 3 seconds on the device, then pressing and holding the set button for 3 seconds. Blinks the LED red for 4 minutes or until unlinked from another device.

Example (Hex): AA BB CC 01 0E XX CF 02 01 (where AA.BB.CC is the Device's ID)

Delete from ALL-Link Group	From Device	Device's ID	0x01, 0x0E, 0xXX (firmware revision)	Broadcast	0x02	0x01	Group number for OutletLinc Dimmer DB load is 0x01
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Enter Linking Mode Command

Description: Same as holding down the SET Button for 3 seconds on the device. Blinks the LED red for 4 minutes or until unlinked from another device.

Example (Hex): AA BB CC DD EE FF 0F 09 01 (where AA.BB.CC is the Device's ID, DD.EE.FF is the Sender's Id)

Enter Linking Mode	To device	Sender's ID	Device's ID	Direct	0x09	0x00 -> 0xFF (Don't Care Value; Always enter group 0x01 linking)	
	Response	Device's ID	Sender's ID	Ack	0x09	Same as sent	
	Sent from Device	Device's ID	0x01 0x0E 0xXX (firmware revision)	Broadcast	0x01	0x00	Same as holding down SET Button for 3 seconds

Enter Unlinking Mode Command

Description: Same as holding down the SET Button for 3 seconds on the device, then pressing and holding the set button for 3 seconds. Blinks the LED red for 4 minutes or until unlinked from another device.

Example (Hex): AA BB CC DD EE FF 0F 0A 01 (where AA.BB.CC is the Device's ID, DD.EE.FF is the Sender's Id)

Enter Unlinking Mode	To device	Sender's ID	Device's ID	Direct	0x0A	0x00 -> 0xFF (Don't Care Value; Always enter group 0x01 unlinking)	
	Response	Device's ID	Sender's ID	Ack	0x0A	Same as sent	
	Sent from Device	Device's ID	0x01 0x0E 0xXX (firmware revision)	Broadcast	0x01	0x00	Same as holding down SET Button for 3 seconds

Ping Command

Description: Same as holding down the SET Button for 3 seconds on the device, then pressing and holding the set button for 3 seconds. Blinks the LED red for 4 minutes or until unlinked from another device.

Example (Hex): AA BB CC DD EE FF 0F 0A 01 (where AA.BB.CC is the Device's ID, DD.EE.FF is the Sender's Id)

Ping	To device	Sender's ID	Device's ID	Direct	0x0F	0x00 -> 0xFF (Don't Care Value)	
	Response	Device's ID	Sender's ID	Ack	0x0F	Same as sent	

ID Request Command

Description: Same as holding down the SET Button for 3 seconds on the device, then pressing and holding the set button for 3 seconds. Blinks the LED red for 4 minutes or until unlinked from another device.

Example (Hex): AA BB CC DD EE FF 0F 0A 01 (where AA.BB.CC is the Device's ID, DD.EE.FF is the Sender's Id)

ID Request	To device	Sender's ID	Device's ID	Direct	0x10	0x00 -> 0xFF (Don't Care Value)	
	Response	Device's ID	Sender's ID	Ack	0x10	Same as sent	
	Sent from Device	Device's ID	0x01 0x0E 0xXX (firmware revision)	Broadcast	0x01	0x00	Same as holding down SET Button for 3 seconds, but device not in linking mode

Standard length OutletLinc Dimmer DB INSTEON commands:

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
Light ON	To device	Sender's ID	Device's ID	Direct	0x11	0x00 -> 0xFF (on level)	Go to On-Level
	Response	Device's ID	Sender's ID	Ack	0x11	Same as sent	

Light ON Fast	To device	Sender's ID	Device's ID	Direct	0x12	0x00 -> 0xFF (on level)	Go to On-Level instantly
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	Response	Device's ID	Sender's ID	Ack	0x12	Same as sent	
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Light OFF	To device	Sender's ID	Device's ID	Direct	0x13	0x00 -> 0xFF (on level)	Go to Off at saved Ramp Rate
	Response	Device's ID	Sender's ID	Ack	0x13	Same as sent	

Light OFF Fast	To device	Sender's ID	Device's ID	Direct	0x14	0x00 -> 0xFF (Don't Care Value)	Go to Off instantly
	Response	Device's ID	Sender's ID	Ack	0x14	Same as sent	

Incremental Bright	To device	Sender's ID	Device's ID	Direct	0x15	0x00 -> 0xFF (Don't Care Value)	Brighten one step. There are 32 steps from off to full brightness
	Acknowledge	Device's ID	Sender's ID	Ack	0x15	Same as sent	

Incremental Dim	To device	Sender's ID	Device's ID	Direct	0x16	0x00 -> 0xFF (Don't Care Value)	Dim one step. There are 32 steps from off to full brightness
	Response	Device's ID	Sender's ID	Ack	0x16	Same as sent	

Start Manual Change	To device	Sender's ID	Device's ID	Direct	0x17	Direction 0x00 Down 0x01 Up 0x02 Unused -> 0xFF	Begin changing On-Level
	Response	Device's ID	Sender's ID	Ack	0x17	Same as sent	

Stop Manual Change	To device	Sender's ID	Device's ID	Direct	0x18	0x00 -> 0xFF (Don't Care Value)	Stop changing On-Level
	Response	Device's ID	Sender's ID	Ack	0x18	Same as sent	

Status Request - Dimmer Status	To device	Sender's ID	Device's ID	Direct	0x19	0x00	
	Response	Device's ID	Sender's ID	Ack	Database Delta	0x00 -> 0xFF (Dimmer Status)	

Status Request - Key Lock Status	To device	Sender's ID	Device's ID	Direct	0x19	0x01	
	Response	Device's ID	Sender's ID	Ack	Database	0x00 = no Key	

		ID	ID		Delta	Lock present, 0x01 = Key Lock present	
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Status Request - Status Moving to	To device	Sender's ID	Device's ID	Direct	0x19	0x02	Status at if not moving
	Response	Device's ID	Sender's ID	Ack	Database Delta	0x00 -> 0xFF (Moving to Status)	

Status Request - Temp Sensor Value	To device	Sender's ID	Device's ID	Direct	0x19	0x03	
	Response	Device's ID	Sender's ID	Ack	Database Delta	0x00 -> 0xFF (Temp Sensor Value)	

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
Read Operating Flags	To device	Sender's ID	Device's ID	Direct	0x1F	Operating Flags Command	See Read Operating Flags Table
	Response	Device's ID	Sender's ID	Ack	0x1F	Same as sent	

Read Operating Flags Table	
0	bit 0 = Plock, bit 1 = LED on TX, bit 2 = Resume Dim, bit 4 = LED OFF, bit 5 = Key Beep
1	Data Base Delta flag....gets incremented with any change in the Database
2	Signal to noise ratio of last failure
3	Signal to noise failure count
5	bit 1 = NX10Flag, bit 2 = blinkonError, bit 3 = CleanupReport 0 = off 1 = On

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
Set Operating Flags	To device	Sender's ID	Device's ID	Direct	0x20	Operating Flags Command	See Set Operating Flags Table below
	Response	Device's ID	Sender's ID	Ack	0x20	Same as sent	

Set Operating Flags Table	
0	Programming lock On
1	Programming lock off
2	LED on with Insteon TX (LED in Light pipe disabled so this command has no effect)
3	LED off with Insteon TX
4	Resume Dim On
5	Resume Dim Off
6	Loadsense off for OutletD
7	Loadsense On for OutletD
8	Led Backlight Off
9	Led Backlight On
0A	KeyBeep On
0B	KeyBeep Off
0C	Rf Off...as an originator, will still hop messages
0D	Rf On
0E	Insteon Off
0F	Insteon On....will go back to on every power cycle
12	X10Offflag On Disables all X10 rx and tx
13	X10Offflag Off
14	Error Blink Off
15	Error Blink On

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
Instant On/Off	To device	Sender's ID	Device's ID	Direct	0x21	0x00 -> 0xFF (on level)	Uses instant Ramp Rate
	Response	Device's ID	Sender's ID	Ack	0x21	Same as sent	
Remote Tap of Set Button	To device	Sender's ID	Device's ID	Direct	0x25	0x00 = Set On Level, 0x02 = Set RR	Load must first be set to corresponding On Level (0x11)
	Response	Device's ID	Sender's ID	Ack	0x25	Same as sent	
Set Hi	To device	Sender's ID	Device's ID	Direct	0x28	0x00 -> 0xFF	Set EEAddrHi for Peek/Poke
	Response	Device's ID	Sender's ID	Ack	0x28	Same as sent	
Poke	To device	Sender's ID	Device's ID	Direct	0x29	0x00 -> 0xFF (LSB for Poke)	Poke at MSB/LSB
	Response	Device's ID	Sender's ID	Ack	0x29	Same as sent	
PeekEE	To device	Sender's ID	Device's ID	Direct	0x2B	0x00 -> 0xFF (LSB for Peek)	Peek at MSB/LSB
	Response	Device's ID	Sender's ID	Ack	0x2B	Same as sent	
RR On	To device	Sender's ID	Device's ID	Direct	0x2E	On level = $16*On + 0F$ RR = $2*RR+1$	
	Response	Device's ID	Sender's ID	Ack	0x2E	Same as sent	
RR Off	To device	Sender's ID	Device's ID	Direct	0x2F	On level = 00 RR = $2*RR+1$	
	Response	Device's ID	Sender's ID	Ack	0x2F	Same as sent	
Beep	To device	Sender's ID	Device's ID	Direct	0x30	0x00 -> 0xFF (Don't care value)	Beeps for standard duration (same as Set Button Pressed)
	Response	Device's ID	Sender's ID	Ack	0x30	Same as sent	

	0x20 for none)								
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Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set Ramp Rate for Group/Button	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x01	See Set Ramp Rate Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set Ramp Rate Info									
Data 2 (1 byte)	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9	Data 10	Data 11
0x05	0x01 -> 0x1F (Ramp Rate, 8 minutes to .1 seconds 0x00 = 2 seconds)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set On-Level for Group/Button	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x01	See Set On-Level Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set On-Level Info									
Data 2 (1 byte)	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9	Data 10	Data 11
0x06	0x00 -> 0xFF (On-level)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set LED Brightness	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x00	See Set LED Brightness Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set LED Brightness Info									
Data 2 (1 byte)	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9	Data 10	Data 11
0x07	0x11 -> 0x7F (brightness)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/a

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set Overtemp	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x00	See Set Overtemp Mask Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set Overtemp Info									
Data 2 (1 byte)	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9	Data 10	Data 11
0x08	0x00 -> 0xFF for max temp (0x00 and 0xFF = never overtemp; note: 50h is 70 degrees and 63h is the default)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/a

Note: when overtemp is reached the local dimmer shuts off, the unit beeps and the LED flashes red.

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Get Database	To device	Sender's ID	Device's ID	Extended Direct	0x2F	0x00	0x00 -> 0xFF (Don't Care Value)	See Get Database Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2F	0x00	N/A	N/A
	From device	Device's ID	Sender's ID	Extended Direct	0x2E	0x00	Same as sent	See Returned Extended Get Database Info

Get Database Info									
Data 2 (1 byte)	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9	Data 10	Data 11
0x00	0x00 -> 0xFF (Hi Byte Address)	0x00 -> 0xFF (Lo Byte Address)	0x00 -> 0xFF (# of Records, 0x00 dumps all records)	N/A	N/A	N/A	N/A	N/A	N/A

Returned Extended Get Database Info (will continue to be sent until # of records is sent or until the first never been used record is sent)									
Data 2 (1 byte)	Data 3	Data 4 (1 byte)	Data 5	Data 6	Data 7	Data 8	Data 9	...	Data 13
0x01	0x00 -> 0xFF (Hi Byte Address)	0x00 -> 0xFF (Lo Byte Address)	0x00	Byte 1 of record	Byte 2 of record	Byte 3 of record	Byte 4 of record		Byte 8 of record

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set Database	To device	Sender's ID	Device's ID	Extended Direct	0x2F	0x00	0x00 -> 0xFF (Don't Care Value)	See Set Database Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2F	0x00	N/A	N/A

Set Database Info									
Data 2 (1 byte)	Data 3	Data 4 (1 byte)	Data 5	Data 6	Data 7	Data 8	Data 9	...	Data 13
0x02	0x00 -> 0xFF (Hi Byte Address)	0x00 -> 0xFF (Lo Byte Address)	0x01 -> 0x08 (# of bytes to write, over 0x08 is an error and ignored)	Byte 1 of data	Byte 2 of data	Byte 3 of data	Byte 4 of data		Byte 8 of data

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Trigger Group	To device	Sender's ID	Device's ID	Extended Direct	0x30	0x00	0x00 -> 0xFF (Group/Button)	See Trigger Group Info
	Response	Device's ID	Sender's ID	Standard Ack	0x30	0x00	N/A	N/A

Trigger Group Info									
Data 2 (1 byte)	Data 3	Data 4 (1 byte)	Data 5	Data 6	Data 7	Data 8	Data 9	...	Data 13
0x00 = use local On-Level, 0x01 = use Data 3 Level (Note: The Command to the group is not parsed, so if you want the local load to go off, you must set data2 to 1 and data3 to 0)	0x00 -> 0xFF (On-Level if data2 = 0x01)	Cmd1	Cmd2	0x00 = local Ramp Rate, 0x01 = instant Ramp Rate	N/A	N/A	N/A		N/A

1.2 Memory Map

1.2.1 All-Link Database (ALDB/L) Overview

The ALDB/L starts at the top of external (serial) EEPROM and grows downward. In the OutletLinc Dimmer Dual Band, top of memory is 0x0FFF. Each ALDB/L Record is 8 bytes long, so the first record starts at 0x0FF8, the second record starts at 0x0FF0, and so on down to 0x0300 for a total of 416 links. In what follows, the 3-byte INSTEON Address contained in a record is called the *Device ID* or sometimes just the *ID*. The high byte (MSB) of the Device ID is *ID2*, the middle byte is *ID1*, and the low byte (LSB) is *ID0*.

1.2.2 OutletLinc Dimmer Dual Band External EEPROM Structure Overview

Location		Comments
0x0FF8	0xA2 01 AA BB CC FF FE 00	All-Link Database Record
0x0FF0		
0x0FD8		
.....		
0x0300		Last Record, 416 total links allowed
0x02XX	N/A	Addressing below 0x0300 is ignored by database

1.2.3 ALDB/L Record Format

OutletLinc Dimmer Dual band ALDB Record Format

Database entries with Record Control Bit 6: 0 = Responder and Group 1 will control the local load.

Linear ALL-Link Database (ALDB/L) Record Format

Field	Length (bytes)	Description
Record Control	1	Record Control Flag Bits: Bit 7: 1 = Record is in use, 0 = Record is available Bit 6: 1 = Controller (Master) of Device ID, 0 = Responder to (Slave of) Device ID Bit 5: Not used Bit 4: Not used Bit 3: Not used Bit 2: Not used Bit 1: 1 = Record has been used before, 0 = 'High-water Mark' Bit 0: Not used
Group	1	ALL-Link Group Number this Device ID belongs to
ID	3	Device ID (ID2, ID1, ID0 in that order)
Data 1	1	On-Level (0x00 -> 0xFF)
Data 2	1	Ramp Rate (0x00 -> 0xFF) See the Ramp Rate Table for values
Data 3	1	Not used

To add a record to an ALDB/L, you search for an existing record that is marked available. (Available means the same as empty, unused or deleted.) If none is available, you create a new record at the end of the ALDB/L.

An unused record will have bit 7 of the *Record Control* byte set to zero. The last record in an ALDB/L will have bit 1 of the *Record Control* byte set to zero.

1.2.4 Overwriting an Empty ALDB/L Record

If you found an empty record, you simply overwrite it with your new record data.

Change bit 7 of the *Record Control* byte from zero to one to show that the record is now in use.

Set bit 6 of the *Record Control* byte to one if the device containing the ALDB/L is an INSTEON Controller of the INSTEON Responder Device whose *ID* is in the record. If instead the device containing the ALDB/L is an INSTEON Responder to the INSTEON Controller Device whose *ID* is in the record, then clear bit 6 of the *Record Control* byte to zero. In other words, within an ALDB/L, setting bit 6 means "I'm a Controller," and clearing bit 6 means "I'm a Responder."

Put the ALL-Link Group number in the *Group* field, and put the *Device ID* in the *ID* field. Finally, set the *Data 1*, *Data 2*, and *Data 3* fields appropriately for the *Record Class* you are storing.

1.2.5 Creating a New ALDB/L Record

To create a new record at the end of the ALDB/T, find the record with bit 1 of the *Record Control* byte set to zero, indicating that it is the last record in the ALDB/L. Flip that bit to one.