**Record Format**

[Home](http://www.keil.com/support/man/docs/ohx51/default.htm) » [Intel HEX File Format](http://www.keil.com/support/man/docs/ohx51/ohx51_intelhex.htm) » Record Format

An Intel HEX file is composed of any number of HEX records. Each record is made up of five fields arranged in the following format:

:llaaaatt[dd...]cc

Each group of letters corresponds to a different field, and each letter represents a single hexadecimal digit. Each field is composed of at least two hexadecimal digits (which make up a byte) as described below:

**Where**

|  |  |
| --- | --- |
| : | the colon that starts every Intel HEX record. |
| ll | is the record-length field that represents the number of data bytes (*dd*) in the record. |
| aaaa | is the address field that represents the starting address for subsequent data in the record. |
| tt | is the field that represents the HEX record type, which can be one of the following types:  00 data record 01 end-of-file record 02 8086 segment address record 04 extended linear address record |
| dd | is a data field that represents one byte of data. A record can have several data bytes. The number of data bytes in the record must match the number specified by the *ll* field. |
| cc | is the checksum field that represents the checksum of the record. The checksum is calculated by adding the values of all hexadecimal digit pairs in the record modulo 256 and taking the two's complement. |

**Data Record**

[Home](http://www.keil.com/support/man/docs/ohx51/default.htm) » [Intel HEX File Format](http://www.keil.com/support/man/docs/ohx51/ohx51_intelhex.htm) » Data Record

The Intel HEX file is made up of any number of data records terminated with a carriage return and a linefeed. Data records appear as follows:

:10246200464C5549442050524F46494C4500464C33

**Where**

|  |  |
| --- | --- |
| 10 | is the number of data bytes in the record. |
| 2462 | is the address where the data are to be located in memory. |
| 00 | is the record type 00 (a data record). |
| 464C...464C | is the data. |
| 33 | is the checksum of the record. |

**Segment Address Record**

[Home](http://www.keil.com/support/man/docs/ohx51/default.htm) » [Intel HEX File Format](http://www.keil.com/support/man/docs/ohx51/ohx51_intelhex.htm) » Segment Address Record

The Intel HEX file contains 8086 segment address records to specify a paragraph number (one paragraph is 16 bytes). This record type is replaced by an extended linear-address record if you are using the H167 directive. The paragraph number is used as the offset for all subsequent data records in the HEX file. 8086 segment address records appear as follows:

:020000021000EC

**Where**

|  |  |
| --- | --- |
| 02 | is the number of data bytes in the record. |
| 0000 | is always 0 in an extended 8086 segment record. |
| 02 | is the record type 02 (an extended linear-address record). |
| 1000 | is the paragraph number (address: 0x10000). |
| EC | is the checksum of the record. |

**Extended Address Record**

[Home](http://www.keil.com/support/man/docs/ohx51/default.htm) » [Intel HEX File Format](http://www.keil.com/support/man/docs/ohx51/ohx51_intelhex.htm) » Extended Address Record

The Intel HEX file contains extended linear-address records when the H167 directive is used. This record specifies the two most significant bytes (bits 16 and 31) of the absolute address. This address offset is used for all subsequent data records in the HEX file. Extended linear-address records appear as follows:

:0200000400FFFB

**Where**

|  |  |
| --- | --- |
| 02 | is the number of data bytes in the record. |
| 0000 | is always 0 in a extended 8086 segment record. |
| 04 | is the record type 04 (an extended linear-address record). |
| 00FF | is the high word of the address offset (0x00FF0000). |
| FB | is the checksum of the record. |

**End-of-File (EOF) Record**

[Home](http://www.keil.com/support/man/docs/ohx51/default.htm) » [Intel HEX File Format](http://www.keil.com/support/man/docs/ohx51/ohx51_intelhex.htm) » End-of-File (EOF) Record

An Intel HEX file must end with an end-of-file (EOF) record. This record must have the value 01 in the record type field. An EOF record always appears as follows:

:00000001FF

**Where**

|  |  |
| --- | --- |
| 00 | is the number of data bytes in the record. |
| 0000 | is the address where the data are to be located in memory. The address in end-of-file records is meaningless and is ignored. An address of 0000h is typical. |
| 01 | is the record type 01 (an end-of-file record). |
| FF | is the checksum of the record and is calculated as 01h + NOT(00h + 00h + 00h + 01h). |

# Example Intel HEX File

[Home](http://www.keil.com/support/man/docs/ohx51/default.htm) » [Intel HEX File Format](http://www.keil.com/support/man/docs/ohx51/ohx51_intelhex.htm) » Example Intel HEX File

The following box contains an example of a complete Intel HEX file:

:020000021000EC

:10C20000E0A5E6F6FDFFE0AEE00FE6FCFDFFE6FD93

:10C21000FFFFF6F50EFE4B66F2FA0CFEF2F40EFE90

:10C22000F04EF05FF06CF07DCA0050C2F086F097DF

:10C23000F04AF054BCF5204830592D02E018BB03F9

:020000020000FC

:04000000FA00000200

:00000001FF