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# CFNumber Reference

Core Foundation



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# CFNumber Reference

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<b>Derived From:</b>	CFPropertyList : CType
<b>Framework:</b>	CoreFoundation/CoreFoundation.h
<b>Companion guide</b>	Property List Programming Topics for Core Foundation
<b>Declared in</b>	CFNumber.h

## Overview

CFNumber encapsulates C scalar (numeric) types. It provides functions for setting and accessing the value as any basic C type. It also provides a compare function to determine the ordering of two CFNumber objects. CFNumber objects are used to wrap numerical values for use in Core Foundation property lists and collections.

CFNumber objects are not intended as a replacement for C scalar values and should not be used in APIs or implementations where scalar values are more appropriate and efficient.

**Note:** In order to improve performance, some commonly-used numbers (such as 0 and 1) are uniqued. You should not expect that allocating multiple CFNumber instances will necessarily result in distinct objects.

CFNumber is “toll-free bridged” with its Cocoa Foundation counterpart, NSNumber. This means that the Core Foundation type is interchangeable in function or method calls with the bridged Foundation object. Therefore, in a method where you see an `NSNumber *` parameter, you can pass in a `CFNumberRef`, and in a function where you see a `CFNumberRef` parameter, you can pass in an `NSNumber` instance. This fact also applies to concrete subclasses of `NSNumber`. See *Integrating Carbon and Cocoa in Your Application* for more information on toll-free bridging.

## Functions by Task

### Creating a Number

[CFNumberCreate](#) (page 7)

Creates a CFNumber object using a specified value.

## Getting Information About Numbers

[CFNumberGetByteSize](#) (page 8)

Returns the number of bytes used by a CFNumber object to store its value.

[CFNumberGetType](#) (page 8)

Returns the type used by a CFNumber object to store its value.

[CFNumberGetValue](#) (page 9)

Obtains the value of a CFNumber object cast to a specified type.

[CFNumberIsFloatType](#) (page 10)

Determines whether a CFNumber object contains a value stored as one of the defined floating point types.

## Comparing Numbers

[CFNumberCompare](#) (page 6)

Compares two CFNumber objects and returns a comparison result.

## Getting the CFNumber Type ID

[CFNumberGetTypeID](#) (page 9)

Returns the type identifier for the CFNumber opaque type.

# Functions

### CFNumberCompare

Compares two CFNumber objects and returns a comparison result.

```
CFComparisonResult CFNumberCompare (
    CFNumberRef number,
    CFNumberRef otherNumber,
    void *context
);
```

#### Parameters

*number*

The first CFNumber object to compare.

*otherNumber*

The second CFNumber object to compare.

*context*

Pass NULL.

#### Return Value

A `CFComparisonResult` constant that indicates whether *number* is equal to, less than, or greater than *otherNumber*.

**Discussion**

When comparing two CFNumber objects using this function, one or both objects can represent a special-case number such as signed 0, signed infinity, or NaN.

The following rules apply:

- Negative 0 compares less than positive 0.
- Positive infinity compares greater than everything except itself, to which it compares equal.
- Negative infinity compares less than everything except itself, to which it compares equal.
- If both numbers are NaN, then they compare equal.
- If only one of the numbers is NaN, then the NaN compares greater than the other number if it is negative, and smaller than the other number if it is positive.

**Availability**

Available in CarbonLib v1.0 and later.

Available in Mac OS X v10.0 and later.

**Declared In**

CFNumber.h

**CFNumberCreate**

Creates a CFNumber object using a specified value.

```
CFNumberRef CFNumberCreate (
    CFAAllocatorRef allocator,
    CFNumberType theType,
    const void *valuePtr
);
```

**Parameters**

*allocator*

The allocator to use to allocate memory for the new object. Pass `NULL` or `kCFAAllocatorDefault` to use the default allocator.

*theType*

A constant that specifies the data type of the value to convert. See [Number Types](#) (page 11) for a list of possible values.

*valuePtr*

A pointer to the value for the returned number object.

**Return Value**

A new number with the value specified by *valuePtr*. Ownership follows the Create Rule.

**Discussion**

The *theType* parameter is not necessarily preserved when creating a new CFNumber object. The CFNumber object will be created using whatever internal storage type the creation function deems appropriate. Use the function [CFNumberGetType](#) (page 8) to find out what type the CFNumber object used to store your value.

**Availability**

Available in CarbonLib v1.0 and later.

Available in Mac OS X v10.0 and later.

**Related Sample Code**

BSDLLCTest  
HID Calibrator  
HID Explorer  
MoreIsBetter  
QTMetaData

**Declared In**

CFNumber.h

**CFNumberGetByteSize**

Returns the number of bytes used by a CFNumber object to store its value.

```
CFIndex CFNumberGetByteSize (  
    CFNumberRef number  
);
```

**Parameters**

*number*

The CFNumber object to examine.

**Return Value**

The size in bytes of the value contained in *number*.

**Discussion**

Because a CFNumber object might store a value using a type different from that of the original value with which it was created, this function may return a size different from the size of the original value's type.

**Availability**

Available in CarbonLib v1.0 and later.

Available in Mac OS X v10.0 and later.

**Declared In**

CFNumber.h

**CFNumberGetType**

Returns the type used by a CFNumber object to store its value.

```
CFNumberType CFNumberGetType (  
    CFNumberRef number  
);
```

**Parameters**

*number*

The CFNumber object to examine.

**Return Value**

A constant that indicates the data type of the value contained in *number*. See [Number Types](#) (page 11) for a list of possible values.



**Discussion**

The type specified in the call to [CFNumberCreate](#) (page 7) is not necessarily preserved when a new CFNumber object is created—it uses whatever internal storage type the creation function deems appropriate.

**Availability**

Available in CarbonLib v1.0 and later.

Available in Mac OS X v10.0 and later.

**Declared In**

CFNumber.h

**CFNumberGetTypeID**

Returns the type identifier for the CFNumber opaque type.

```
CTypeID CFNumberGetTypeID (
    void
);
```

**Return Value**

The type identifier for the CFNumber opaque type.

**Availability**

Available in CarbonLib v1.0 and later.

Available in Mac OS X v10.0 and later.

**Related Sample Code**

BSDLLCTest

CFFTPSample

MoreIsBetter

MoreSCF

QISA

**Declared In**

CFNumber.h

**CFNumberGetValue**

Obtains the value of a CFNumber object cast to a specified type.

```
Boolean CFNumberGetValue (
    CFNumberRef number,
    CFNumberType theType,
    void *valuePtr
);
```

**Parameters**

*number*

The CFNumber object to examine.

*theType*

A constant that specifies the data type to return. See [Number Types](#) (page 11) for a list of possible values.

*valuePtr*

On return, contains the value of *number*.

**Return Value**

true if the operation was successful, otherwise false.

**Discussion**

If the argument type differs from the return type, and the conversion is lossy or the return value is out of range, then this function passes back an approximate value in *valuePtr* and returns false.

**Availability**

Available in CarbonLib v1.0 and later.

Available in Mac OS X v10.0 and later.

**Related Sample Code**

AudioCDSample

BSDLLCTest

MoreIsBetter

MoreSCF

QISA

**Declared In**

CFNumber.h

## CFNumberIsFloatType

Determines whether a CFNumber object contains a value stored as one of the defined floating point types.

```
Boolean CFNumberIsFloatType (  
    CFNumberRef number  
);
```

**Parameters**

*number*

The CFNumber object to examine.

**Return Value**

true if *number*'s value is one of the defined floating point types, otherwise false. The valid floating point types are listed in [Number Types](#) (page 11).

**Availability**

Available in CarbonLib v1.0 and later.

Available in Mac OS X v10.0 and later.

**Declared In**

CFNumber.h

## Data Types

### CFNumberRef

A reference to a CFNumber object.

```
typedef const struct __CFNumber *CFNumberRef;
```

#### Availability

Available in Mac OS X v10.0 and later.

#### Declared In

CFNumber.h

## Constants

### Number Types

Flags used by CFNumber to indicate the data type of a value.

```
enum CFNumberType {
    kCFNumberSInt8Type = 1,
    kCFNumberSInt16Type = 2,
    kCFNumberSInt32Type = 3,
    kCFNumberSInt64Type = 4,
    kCFNumberFloat32Type = 5,
    kCFNumberFloat64Type = 6,
    kCFNumberCharType = 7,
    kCFNumberShortType = 8,
    kCFNumberIntType = 9,
    kCFNumberLongType = 10,
    kCFNumberLongLongType = 11,
    kCFNumberFloatType = 12,
    kCFNumberDoubleType = 13,
    kCFNumberCFIndexType = 14,
    kCFNumberNSIntegerType = 15,
    kCFNumberCGFloatType = 16,
    kCFNumberMaxType = 16
};
typedef enum CFNumberType CFNumberType;
```

#### Constants

kCFNumberSInt8Type

Eight-bit, signed integer. The SInt8 data type is defined in MacTypes.h.

Available in Mac OS X v10.0 and later.

Declared in CFNumber.h.

`kCFNumberSInt16Type`

**Sixteen-bit, signed integer.** The `SInt16` data type is defined in `MacTypes.h`.

**Available in Mac OS X v10.0 and later.**

**Declared in `CFNumber.h`.**

`kCFNumberSInt32Type`

**Thirty-two-bit, signed integer.** The `SInt32` data type is defined in `MacTypes.h`.

**Available in Mac OS X v10.0 and later.**

**Declared in `CFNumber.h`.**

`kCFNumberSInt64Type`

**Sixty-four-bit, signed integer.** The `SInt64` data type is defined in `MacTypes.h`.

**Available in Mac OS X v10.0 and later.**

**Declared in `CFNumber.h`.**

`kCFNumberFloat32Type`

**Thirty-two-bit real.** The `Float32` data type is defined in `MacTypes.h`.

**Available in Mac OS X v10.0 and later.**

**Declared in `CFNumber.h`.**

`kCFNumberFloat64Type`

**Sixty-four-bit real.** The `Float64` data type is defined in `MacTypes.h` and conforms to the 64-bit IEEE 754 standard.

**Available in Mac OS X v10.0 and later.**

**Declared in `CFNumber.h`.**

`kCFNumberCharType`

**Basic C `char` type.**

**Available in Mac OS X v10.0 and later.**

**Declared in `CFNumber.h`.**

`kCFNumberShortType`

**Basic C `short` type.**

**Available in Mac OS X v10.0 and later.**

**Declared in `CFNumber.h`.**

`kCFNumberIntType`

**Basic C `int` type.**

**Available in Mac OS X v10.0 and later.**

**Declared in `CFNumber.h`.**

`kCFNumberLongType`

**Basic C `long` type.**

**Available in Mac OS X v10.0 and later.**

**Declared in `CFNumber.h`.**

`kCFNumberLongLongType`

**Basic C `long long` type.**

**Available in Mac OS X v10.0 and later.**

**Declared in `CFNumber.h`.**

`kCFNumberFloatType`

Basic C float type.

Available in Mac OS X v10.0 and later.

Declared in `CFNumber.h`.

`kCFNumberDoubleType`

Basic C double type.

Available in Mac OS X v10.0 and later.

Declared in `CFNumber.h`.

`kCFNumberCFIndexType`

CFIndex value.

Available in Mac OS X v10.0 and later.

Declared in `CFNumber.h`.

`kCFNumberNSIntegerType`

NSInteger value.

Available in Mac OS X v10.5 and later.

Declared in `CFNumber.h`.

`kCFNumberCGFloatType`

CGFloat value.

Available in Mac OS X v10.5 and later.

Declared in `CFNumber.h`.

`kCFNumberMaxType`

Same as `kCFNumberCGFloatType`.

Note that on Mac OS X v10.4, `kCFNumberMaxType` was the same as `kCFNumberCFIndexType`.

Available in Mac OS X v10.0 and later.

Declared in `CFNumber.h`.

### Discussion

The type specified in the call to `CFNumberCreate` (page 7) is not necessarily preserved when creating a new `CFNumber` object. A `CFNumber` object uses whatever internal storage type the creation function deems appropriate. Use the `CFNumberGetType` (page 8) function to find out what type the `CFNumber` object used to store your value.

## Predefined Values

`CFNumber` provides some predefined number values.

```
const CFNumberRef kCFNumberNaN;
const CFNumberRef kCFNumberNegativeInfinity;
const CFNumberRef kCFNumberPositiveInfinity;
```

### Constants

`kCFNumberNaN`

“Not a Number.” This value is often the result of an invalid operation, such as the square-root of a negative number.

Available in Mac OS X v10.0 and later.

Declared in `CFNumber.h`.

`kCFNumberNegativeInfinity`

Designates a negative infinity value.

Available in Mac OS X v10.0 and later.

Declared in `CFNumber.h`.

`kCFNumberPositiveInfinity`

Designates a positive infinity value.

Available in Mac OS X v10.0 and later.

Declared in `CFNumber.h`.

# Document Revision History

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This table describes the changes to *CFNumber Reference*.

Date	Notes
2006-12-01	Updated to include new API in Mac OS X v10.5.
2005-12-06	Made minor changes to text to conform to reference consistency guidelines.
2005-04-29	Added note to Introduction regarding uniquing of commonly-used numbers.
2003-01-01	First version of this document.

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