NAME

tgmath - type-generic macros

SYNOPSIS

#include <tgmath.h>

DESCRIPTION

The header <*tgmath.h*> provides type-generic macros for <*math.h*> and <*complex.h*> functions that have *float* (suffixed with **f**), *double* and *long double* (suffixed with **l**) versions. The arguments that vary across the three functions and have type *float*, *double* and *long double*, respectively, are called *generic arguments*.

The following rules describe which function is actually called if a type-generic macro is invoked. If any generic argument has type *long double* or *long double complex*, the *long double* function is called. Else, if any generic argument has type *double*, *double complex* or an integer type, the *double* version is invoked. Otherwise, the macro expands to the *float* implementation.

For the macros in the following table, both real and complex functions exist. The real functions are prototyped in <*math.h*> and the complex equivalents in <*complex.h*>. The complex function is called if any of the generic arguments is a complex value. Otherwise, the real equivalent is called.

Macro	real function	complex function
acos()	**acos**()	**cacos**()
asin()	**asin**()	**casin**()
atan()	**atan**()	**catan**()
acosh()	**acosh**()	**cacosh**()
asinh()	**asinh**()	**casinh**()
atanh()	**atanh**()	**catanh**()
cos()	**cos**()	**ccos**()
sin()	**sin**()	**csin**()
tan()	**tan**()	**ctan**()
cosh()	**cosh**()	**ccosh**()
sinh()	**sinh**()	**csinh**()
tanh()	**tanh**()	**ctanh**()
exp()	**exp**()	**cexp**()
log()	**log**()	**clog**()
pow()	**pow**()	**cpow**()
sqrt()	**sqrt**()	**csqrt**()
fabs()	**fabs**()	**cabs**()

No complex functions exist for the following macros, so passing a complex value to a generic argument invokes undefined behaviour:

atan2()	**fma**()	**llround**()	**remainder**()
cbrt()	**fmax**()	**log10**()	**remquo**()
ceil()	**fmin**()	**log1p**()	**rint**()
copysign()	**fmod**()	**log2**()	**round**()
erf()	**frexp**()	**logb**()	**scalbn**()
erfc()	**hypot**()	**lrint**()	**scalbln**()
exp2()	**ilogb**()	**lround**()	**tgamma**()
expm1()	**ldexp**()	**nearbyint**()	**trunc**()
fdim()	**lgamma**()	**nextafter**()	
floor()	**llrint**()	**nexttoward**()	

The following macros always expand to a complex function:

carg() **cimag**() **conj**() **cproj**() **creal**()

This header includes <*complex.h*> and <*math.h*>.

STANDARDS

The header <*tgmath.h*> conforms to ISO/IEC 9899:1999 ("ISO C99").

HISTORY

The header <*tgmath.h*> first appeared in FreeBSD 5.3.

COMPILER SUPPORT

Before ISO/IEC 9899:2011 ("ISO C11"), the header <*tgmath.h*> could not be implemented with strictly conforming C code and needed special compiler support. As of ISO/IEC 9899:2011 ("ISO C11"), this header file can be implemented using the **_Generic**() language keyword. In addition to compilers that support this keyword, this header file works with GCC.

BUGS

Many of the functions mentioned here are not prototyped in <*math.h*> or <*complex.h*> as they are not yet implemented. This prevents the corresponding type-generic macro from working at all.