

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.