



LIBDEVICE USER'S GUIDE

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Chapter 1.

INTRODUCTION

1.1. What Is libdevice?

The libdevice library is a collection of NVVM bitcode functions that implement common functions for NVIDIA GPU devices, including math primitives and bit-manipulation functions. These functions are optimized for particular GPU architectures, and are intended to be linked with an NVVM IR module during compilation to PTX.

This guide documents both the functions available in libdevice and the basic usage of the library from a compiler writer's perspective.

Chapter 2.

BASIC USAGE

2.1. Linking with libdevice

The libdevice library ships as an LLVM bitcode library and is meant to be linked with the target module early in the compilation process. The standard process for linking with libdevice is to first link it with the target module, then run the standard LLVM optimization and code generation passes. This allows the optimizers to inline and perform analyses on the used library functions, and eliminate any used functions as dead code.

Users of libnvvm can link with libdevice by adding the appropriate libdevice module to the `nvvmProgram` object being compiled. In addition, the following options for `nvvmCompileProgram` affect the behavior of libdevice functions:

Table 1 Supported Reflection Parameters

Parameter	Values	Description
-ftz	0 (default)	preserve denormal values, when performing single-precision floating-point operations
	1	flush denormal values to zero, when performing single-precision floating-point operations
-prec-div	0	use a faster approximation for single-precision floating-point division and reciprocals
	1 (default)	use IEEE round-to-nearest mode for single-precision floating-point division and reciprocals
-prec-sqrt	0	use IEEE round-to-nearest mode for single-precision floating-point square root
	1 (default)	use a faster approximation for single-precision floating-point square root

The following pseudo-code shows an example of linking an NVVM IR module with the libdevice library using libnvvm:

```
nvvmProgram prog;
size_t libdeviceModSize;

const char *libdeviceMod = loadFile('/path/to/libdevice.*.bc',
                                     &libdeviceModSize);
const char *myIr = /* NVVM IR in text or binary format */;
size_t myIrSize = /* size of myIr in bytes */;

// Create NVVM program object
nvvmCreateProgram(&prog);

// Add libdevice module to program
nvvmAddModuleToProgram(prog, libdeviceMod, libdeviceModSize);

// Add custom IR to program
nvvmAddModuleToProgram(prog, myIr, myIrSize);

// Declare compile options
const char *options[] = { "-ftz=1" };

// Compile the program
nvvmCompileProgram(prog, 1, options);
```

It is the responsibility of the client program to locate and read the libdevice library binary (represented by the loadFile function in the example).

Chapter 3.

FUNCTION REFERENCE

This chapter describes all functions available in libdevice.

3.1. __nv_abs

Prototype:

```
i32 @__nv_abs(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.2. __nv_acos

Prototype:

```
double @__nv_acos(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.3. __nv_acosf

Prototype:

```
float @__nv_acosf(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.4. __nv_acosh

Prototype:

```
double @__nv_acosh(double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.5. __nv_acoshf

Prototype:

```
float @__nv_acoshf(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.6. __nv_asin

Prototype:

```
double @__nv_asin(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.7. __nv_asinf

Prototype:

```
float @__nv_asinf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.8. __nv_asinh

Prototype:

```
double @__nv_asinh(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.9. __nv_asinhf

Prototype:

```
float @__nv_asinhf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.10. __nv_atan

Prototype:

```
double @__nv_atan(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.11. __nv_atan2

Prototype:

```
double @__nv_atan2(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.12. __nv_atan2f

Prototype:

```
float @__nv_atan2f(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.13. __nv_atanf

Prototype:

```
float @__nv_atanf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.14. __nv_atanh

Prototype:

```
double @__nv_atanh(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.15. __nv_atanhf

Prototype:

```
float @__nv_atanhf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.16. __nv_brev

Prototype:

```
i32 @__nv_brev(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.17. __nv_brevll

Prototype:

```
i64 @__nv_brevll(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.18. __nv_byte_perm

Prototype:

```
i32 @__nv_byte_perm(i32 %, i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.19. __nv_cbrt

Prototype:

```
double @__nv_cbrt(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.20. __nv_cbrtf

Prototype:

```
float @__nv_cbrtf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.21. __nv_ceil

Prototype:

```
double @__nv_ceil(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.22. __nv_ceilf

Prototype:

```
float @__nv_ceilf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.23. __nv_clz

Prototype:

```
i32 @__nv_clz(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.24. __nv_clzll

Prototype:

```
i32 @__nv_clzll(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.25. __nv_copysign

Prototype:

```
double @__nv_copysign(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.26. __nv_copysignf

Prototype:

```
float @__nv_copysignf(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.27. __nv_cos

Prototype:

```
double @__nv_cos(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.28. __nv_cosf

Prototype:

```
float @__nv_cosf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.29. __nv_cosh

Prototype:

```
double @__nv_cosh(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.30. __nv_coshf

Prototype:

```
float @__nv_coshf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.31. __nv_cospi

Prototype:

```
double @__nv_cospi(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.32. __nv_cospif

Prototype:

```
float @__nv_cospif(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.33. __nv_dadd_rd

Prototype:

```
double @__nv_dadd_rd(double %, double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.34. __nv_dadd_rn

Prototype:

```
double @__nv_dadd_rn(double %, double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.35. __nv_dadd_ru

Prototype:

```
double @__nv_dadd_ru(double %, double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.36. __nv_dadd_rz

Prototype:

```
double @__nv_dadd_rz(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.37. __nv_ddiv_rd

Prototype:

```
double @__nv_ddiv_rd(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.38. __nv_ddiv_rn

Prototype:

```
double @__nv_ddiv_rn(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.39. __nv_ddiv_ru

Prototype:

```
double @__nv_ddiv_ru(double %, double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.40. __nv_ddiv_rz

Prototype:

```
double @__nv_ddiv_rz(double %, double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.41. __nv_dmul_rd

Prototype:

```
double @__nv_dmul_rd(double %, double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.42. __nv_dmul_rn

Prototype:

```
double @__nv_dmul_rn(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.43. __nv_dmul_ru

Prototype:

```
double @__nv_dmul_ru(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.44. __nv_dmul_rz

Prototype:

```
double @__nv_dmul_rz(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.45. __nv_double2float_rd

Prototype:

```
float @__nv_double2float_rd(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.46. __nv_double2float_rn

Prototype:

```
float @__nv_double2float_rn(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.47. __nv_double2float_ru

Prototype:

```
float @__nv_double2float_ru(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.48. __nv_double2float_rz

Prototype:

```
float @__nv_double2float_rz(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.49. __nv_double2hiint

Prototype:

```
i32 @__nv_double2hiint(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.50. __nv_double2int_rd

Prototype:

```
i32 @__nv_double2int_rd(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.51. __nv_double2int_rn

Prototype:

```
i32 @__nv_double2int_rn(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.52. __nv_double2int_ru

Prototype:

```
i32 @__nv_double2int_ru(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.53. __nv_double2int_rz

Prototype:

```
i32 @__nv_double2int_rz(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.54. __nv_double2ll_rd

Prototype:

```
i64 @__nv_double2ll_rd(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.55. __nv_double2ll_rn

Prototype:

```
i64 @__nv_double2ll_rn(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.56. __nv_double2ll_ru

Prototype:

```
i64 @__nv_double2ll_ru(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.57. __nv_double2ll_rz

Prototype:

```
i64 @__nv_double2ll_rz(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.58. __nv_double2loint

Prototype:

```
i32 @__nv_double2loint(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.59. __nv_double2uint_rd

Prototype:

```
i32 @__nv_double2uint_rd(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.60. __nv_double2uint_rn

Prototype:

```
i32 @__nv_double2uint_rn(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.61. __nv_double2uint_ru

Prototype:

```
i32 @__nv_double2uint_ru(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.62. __nv_double2uint_rz

Prototype:

```
i32 @__nv_double2uint_rz(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.63. __nv_double2ull_rd

Prototype:

```
i64 @__nv_double2ull_rd(double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.64. __nv_double2ull_rn

Prototype:

```
i64 @__nv_double2ull_rn(double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.65. __nv_double2ull_ru

Prototype:

```
i64 @__nv_double2ull_ru(double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.66. __nv_double2ull_rz

Prototype:

```
i64 @__nv_double2ull_rz(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.67. __nv_double_as_longlong

Prototype:

```
i64 @__nv_double_as_longlong(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.68. __nv_drcp_rd

Prototype:

```
double @__nv_drcp_rd(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.69. __nv_drcp_rn

Prototype:

```
double @__nv_drcp_rn(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.70. __nv_drcp_ru

Prototype:

```
double @__nv_drcp_ru(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.71. __nv_drcp_rz

Prototype:

```
double @__nv_drcp_rz(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.72. __nv_dsqrt_rd

Prototype:

```
double @__nv_dsqrt_rd(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.73. __nv_dsqrt_rn

Prototype:

```
double @__nv_dsqrt_rn(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.74. __nv_dsqrt_ru

Prototype:

```
double @__nv_dsqrt_ru(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.75. __nv_dsqrt_rz

Prototype:

```
double @__nv_dsqrt_rz(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.76. __nv_erf

Prototype:

```
double @__nv_erf(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.77. __nv_erfc

Prototype:

```
double @__nv_erfc(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.78. __nv_erfcf

Prototype:

```
float @__nv_erfcf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.79. __nv_erfcinv

Prototype:

```
double @__nv_erfcinv(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.80. __nv_erfcinvf

Prototype:

```
float @__nv_erfcinvf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.81. __nv_erfcx

Prototype:

```
double @__nv_erfcx(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.82. __nv_erfcxf

Prototype:

```
float @__nv_erfcxf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.83. __nv_erff

Prototype:

```
float @__nv_erff(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.84. __nv_erfinv

Prototype:

```
double @__nv_erfinv(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.85. __nv_erfinvf

Prototype:

```
float @__nv_erfinvf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.86. __nv_exp

Prototype:

```
double @__nv_exp(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.87. __nv_exp10

Prototype:

```
double @__nv_exp10(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.88. __nv_exp10f

Prototype:

```
float @__nv_exp10f(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.89. __nv_exp2

Prototype:

```
double @__nv_exp2(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.90. __nv_exp2f

Prototype:

```
float @__nv_exp2f(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.91. __nv_expf

Prototype:

```
float @__nv_expf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.92. __nv_expm1

Prototype:

```
double @__nv_expm1(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.93. __nv_expmlf

Prototype:

```
float @__nv_expmlf(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.94. __nv_fabs

Prototype:

```
double @__nv_fabs(double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.95. __nv_fabsf

Prototype:

```
float @__nv_fabsf(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.96. __nv_fadd_rd

Prototype:

```
float @__nv_fadd_rd(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.97. __nv_fadd_rn

Prototype:

```
float @__nv_fadd_rn(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.98. __nv_fadd_ru

Prototype:

```
float @__nv_fadd_ru(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.99. __nv_fadd_rz

Prototype:

```
float @__nv_fadd_rz(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.100. __nv_fast_cosf

Prototype:

```
float @__nv_fast_cosf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.101. __nv_fast_exp10f

Prototype:

```
float @__nv_fast_exp10f(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.102. __nv_fast_expf

Prototype:

```
float @__nv_fast_expf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.103. __nv_fast_fdividef

Prototype:

```
float @__nv_fast_fdividef(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.104. __nv_fast_log10f

Prototype:

```
float @__nv_fast_log10f(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.105. __nv_fast_log2f

Prototype:

```
float @__nv_fast_log2f(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.106. __nv_fast_logf

Prototype:

```
float @__nv_fast_logf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.107. __nv_fast_powf

Prototype:

```
float @__nv_fast_powf(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.108. __nv_fast_sincosf

Prototype:

```
void @__nv_fast_sincosf(float %, float* %, float* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.109. __nv_fast_sinf

Prototype:

```
float @__nv_fast_sinf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.110. __nv_fast_tanf

Prototype:

```
float @__nv_fast_tanf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.111. __nv_fdim

Prototype:

```
double @__nv_fdim(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.112. __nv_fdimf

Prototype:

```
float @__nv_fdimf(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.113. __nv_fdiv_rd

Prototype:

```
float @__nv_fdiv_rd(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.114. __nv_fdiv_rn

Prototype:

```
float @__nv_fdiv_rn(float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.115. __nv_fdiv_ru

Prototype:

```
float @__nv_fdiv_ru(float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.116. __nv_fdiv_rz

Prototype:

```
float @__nv_fdiv_rz(float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.117. __nv_ffs

Prototype:

```
i32 @__nv_ffs(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.118. __nv_ffsll

Prototype:

```
i32 @__nv_ffsll(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.119. __nv_finitef

Prototype:

```
i32 @__nv_finitef(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.120. __nv_float2half_rn

Prototype:

```
i16 @__nv_float2half_rn(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.121. __nv_float2int_rd

Prototype:

```
i32 @__nv_float2int_rd(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.122. __nv_float2int_rn

Prototype:

```
i32 @__nv_float2int_rn(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.123. __nv_float2int_ru

Prototype:

```
i32 @__nv_float2int_ru(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.124. __nv_float2int_rz

Prototype:

```
i32 @__nv_float2int_rz(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.125. __nv_float2ll_rd

Prototype:

```
i64 @__nv_float2ll_rd(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.126. __nv_float2ll_rn

Prototype:

```
i64 @__nv_float2ll_rn(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.127. __nv_float2ll_ru

Prototype:

```
i64 @__nv_float2ll_ru(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.128. __nv_float2ll_rz

Prototype:

```
i64 @__nv_float2ll_rz(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.129. __nv_float2uint_rd

Prototype:

```
i32 @__nv_float2uint_rd(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.130. __nv_float2uint_rn

Prototype:

```
i32 @__nv_float2uint_rn(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.131. __nv_float2uint_ru

Prototype:

```
i32 @__nv_float2uint_ru(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.132. __nv_float2uint_rz

Prototype:

```
i32 @__nv_float2uint_rz(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.133. __nv_float2ull_rd

Prototype:

```
i64 @__nv_float2ull_rd(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.134. __nv_float2ull_rn

Prototype:

```
i64 @__nv_float2ull_rn(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.135. __nv_float2ull_ru

Prototype:

```
i64 @__nv_float2ull_ru(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.136. __nv_float2ull_rz

Prototype:

```
i64 @__nv_float2ull_rz(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.137. __nv_float_as_int

Prototype:

```
i32 @__nv_float_as_int(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.138. __nv_floor

Prototype:

```
double @__nv_floor(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.139. __nv_floorf

Prototype:

```
float @__nv_floorf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.140. __nv_fma

Prototype:

```
double @__nv_fma(double %, double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.141. __nv_fma_rd

Prototype:

```
double @__nv_fma_rd(double %, double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.142. __nv_fma_rn

Prototype:

```
double @__nv_fma_rn(double %, double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.143. __nv_fma_ru

Prototype:

```
double @__nv_fma_ru(double %, double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.144. __nv_fma_rz

Prototype:

```
double @__nv_fma_rz(double %, double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.145. __nv_fmaf

Prototype:

```
float @__nv_fmaf(float %, float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.146. __nv_fmaf_rd

Prototype:

```
float @__nv_fmaf_rd(float %, float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.147. __nv_fmaf_rn

Prototype:

```
float @__nv_fmaf_rn(float %, float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.148. __nv_fmaf_ru

Prototype:

```
float @__nv_fmaf_ru(float %, float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.149. __nv_fmaf_rz

Prototype:

```
float @__nv_fmaf_rz(float %, float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.150. __nv_fmax

Prototype:

```
double @__nv_fmax(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.151. __nv_fmaxf

Prototype:

```
float @__nv_fmaxf(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.152. __nv_fmin

Prototype:

```
double @__nv_fmin(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.153. __nv_fminf

Prototype:

```
float @__nv_fminf(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.154. __nv_fmod

Prototype:

```
double @__nv_fmod(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.155. __nv_fmodf

Prototype:

```
float @__nv_fmodf(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.156. __nv_fmul_rd

Prototype:

```
float @__nv_fmul_rd(float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.157. __nv_fmul_rn

Prototype:

```
float @__nv_fmul_rn(float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.158. __nv_fmul_ru

Prototype:

```
float @__nv_fmul_ru(float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.159. __nv_fmul_rz

Prototype:

```
float @__nv_fmul_rz(float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.160. __nv_frcp_rd

Prototype:

```
float @__nv_frcp_rd(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.161. __nv_frcp_rn

Prototype:

```
float @__nv_frcp_rn(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.162. __nv_frcp_ru

Prototype:

```
float @__nv_frcp_ru(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.163. __nv_frcp_rz

Prototype:

```
float @__nv_frcp_rz(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.164. __nv_frexp

Prototype:

```
double @__nv_frexp(double %, i32* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.165. __nv_frexp

Prototype:

```
float @__nv_frexp(float %, i32* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.166. __nv_frsqrt_rn

Prototype:

```
float @__nv_frsqrt_rn(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.167. __nv_fsqrt_rd

Prototype:

```
float @__nv_fsqrt_rd(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.168. __nv_fsqrt_rn

Prototype:

```
float @__nv_fsqrt_rn(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.169. __nv_fsqrt_ru

Prototype:

```
float @__nv_fsqrt_ru(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.170. __nv_fsqrt_rz

Prototype:

```
float @__nv_fsqrt_rz(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.171. __nv_fsub_rd

Prototype:

```
float @__nv_fsub_rd(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.172. __nv_fsub_rn

Prototype:

```
float @__nv_fsub_rn(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.173. __nv_fsub_ru

Prototype:

```
float @__nv_fsub_ru(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.174. __nv_fsub_rz

Prototype:

```
float @__nv_fsub_rz(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.175. __nv_hadd

Prototype:

```
i32 @__nv_hadd(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.176. __nv_half2float

Prototype:

```
float @__nv_half2float(i16 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.177. __nv_hiloint2double

Prototype:

```
double @__nv_hiloint2double(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.178. __nv_hypot

Prototype:

```
double @__nv_hypot(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.179. __nv_hypotf

Prototype:

```
float @__nv_hypotf(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.180. __nv_ilogb

Prototype:

```
i32 @__nv_ilogb(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.181. __nv_ilogbf

Prototype:

```
i32 @__nv_ilogbf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.182. __nv_int2double_rn

Prototype:

```
double @__nv_int2double_rn(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.183. __nv_int2float_rd

Prototype:

```
float @__nv_int2float_rd(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.184. __nv_int2float_rn

Prototype:

```
float @__nv_int2float_rn(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.185. __nv_int2float_ru

Prototype:

```
float @__nv_int2float_ru(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.186. __nv_int2float_rz

Prototype:

```
float @__nv_int2float_rz(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.187. __nv_int_as_float

Prototype:

```
float @__nv_int_as_float(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.188. __nv_isfinitd

Prototype:

```
i32 @__nv_isfinitd(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.189. `__nv_isinfd`

Prototype:

```
i32 @__nv_isinfd(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.190. `__nv_isinff`

Prototype:

```
i32 @__nv_isinff(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.191. `__nv_isnand`

Prototype:

```
i32 @__nv_isnand(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.192. __nv_isnanf

Prototype:

```
i32 @__nv_isnanf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.193. __nv_j0

Prototype:

```
double @__nv_j0(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.194. __nv_j0f

Prototype:

```
float @__nv_j0f(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.195. __nv_j1

Prototype:

```
double @__nv_j1(double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.196. __nv_j1f

Prototype:

```
float @__nv_j1f(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.197. __nv_jn

Prototype:

```
double @__nv_jn(i32 %, double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.198. __nv_jnf

Prototype:

```
float @__nv_jnf(i32 %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.199. __nv_ldexp

Prototype:

```
double @__nv_ldexp(double %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.200. __nv_ldexpf

Prototype:

```
float @__nv_ldexpf(float %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.201. __nv_lgamma

Prototype:

```
double @__nv_lgamma(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.202. __nv_lgammaf

Prototype:

```
float @__nv_lgammaf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.203. __nv_ll2double_rd

Prototype:

```
double @__nv_ll2double_rd(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.204. __nv_ll2double_rn

Prototype:

```
double @__nv_ll2double_rn(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.205. __nv_ll2double_ru

Prototype:

```
double @__nv_ll2double_ru(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.206. __nv_ll2double_rz

Prototype:

```
double @__nv_ll2double_rz(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.207. __nv_ll2float_rd

Prototype:

```
float @__nv_ll2float_rd(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.208. __nv_ll2float_rn

Prototype:

```
float @__nv_ll2float_rn(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.209. __nv_ll2float_ru

Prototype:

```
float @__nv_ll2float_ru(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.210. __nv_ll2float_rz

Prototype:

```
float @__nv_ll2float_rz(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.211. __nv_llabs

Prototype:

```
i64 @__nv_llabs(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.212. __nv_llmax

Prototype:

```
i64 @__nv_llmax(i64 %, i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.213. __nv_llmin

Prototype:

```
i64 @__nv_llmin(i64 %, i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.214. __nv_llrint

Prototype:

```
i64 @__nv_llrint(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.215. __nv_llrintf

Prototype:

```
i64 @__nv_llrintf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.216. __nv_llround

Prototype:

```
i64 @__nv_llround(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.217. __nv_llroundf

Prototype:

```
i64 @__nv_llroundf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.218. __nv_log

Prototype:

```
double @__nv_log(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.219. __nv_log10

Prototype:

```
double @__nv_log10(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.220. __nv_log10f

Prototype:

```
float @__nv_log10f(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.221. __nv_log1p

Prototype:

```
double @__nv_log1p(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.222. __nv_log1pf

Prototype:

```
float @__nv_log1pf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.223. __nv_log2

Prototype:

```
double @__nv_log2(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.224. __nv_log2f

Prototype:

```
float @__nv_log2f(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.225. __nv_logb

Prototype:

```
double @__nv_logb(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.226. __nv_logbf

Prototype:

```
float @__nv_logbf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.227. __nv_logf

Prototype:

```
float @__nv_logf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.228. __nv_longlong_as_double

Prototype:

```
double @__nv_longlong_as_double(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.229. __nv_max

Prototype:

```
i32 @__nv_max(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.230. __nv_min

Prototype:

```
i32 @__nv_min(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.231. __nv_modf

Prototype:

```
double @__nv_modf(double %, double* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.232. __nv_modff

Prototype:

```
float @__nv_modff(float %, float* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.233. __nv_mul24

Prototype:

```
i32 @__nv_mul24(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.234. __nv_mul64hi

Prototype:

```
i64 @__nv_mul64hi(i64 %, i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.235. __nv_mulhi

Prototype:

```
i32 @__nv_mulhi(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.236. __nv_nan

Prototype:

```
double @__nv_nan(i8* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.237. __nv_nanf

Prototype:

```
float @__nv_nanf(i8* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.238. __nv_nearbyint

Prototype:

```
double @__nv_nearbyint(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.239. __nv_nearbyintf

Prototype:

```
float @__nv_nearbyintf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.240. __nv_nextafter

Prototype:

```
double @__nv_nextafter(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.241. __nv_nextafterf

Prototype:

```
float @__nv_nextafterf(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.242. __nv_normcdf

Prototype:

```
double @__nv_normcdf(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.243. `__nv_normcdf`

Prototype:

```
float @__nv_normcdf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.244. `__nv_normcdfinv`

Prototype:

```
double @__nv_normcdfinv(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.245. `__nv_normcdfinvf`

Prototype:

```
float @__nv_normcdfinvf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.246. __nv_popc

Prototype:

```
i32 @__nv_popc(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.247. __nv_popc1l

Prototype:

```
i32 @__nv_popc1l(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.248. __nv_pow

Prototype:

```
double @__nv_pow(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.249. __nv_powf

Prototype:

```
float @__nv_powf(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.250. __nv_powi

Prototype:

```
double @__nv_powi(double %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.251. __nv_powif

Prototype:

```
float @__nv_powif(float %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.252. __nv_rcbrt

Prototype:

```
double @__nv_rcbrt(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.253. __nv_rcbrtf

Prototype:

```
float @__nv_rcbrtf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.254. __nv_remainder

Prototype:

```
double @__nv_remainder(double %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.255. __nv_remainderf

Prototype:

```
float @__nv_remainderf(float %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.256. __nv_remquo

Prototype:

```
double @__nv_remquo(double %, double %, i32* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.257. __nv_remquof

Prototype:

```
float @__nv_remquof(float %, float %, i32* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.258. __nv_rhadd

Prototype:

```
i32 @__nv_rhadd(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.259. __nv_rint

Prototype:

```
double @__nv_rint(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.260. __nv_rintf

Prototype:

```
float @__nv_rintf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.261. __nv_round

Prototype:

```
double @__nv_round(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.262. __nv_roundf

Prototype:

```
float @__nv_roundf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.263. __nv_rsqrt

Prototype:

```
double @__nv_rsqrt(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.264. __nv_rsqrtf

Prototype:

```
float @__nv_rsqrtf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.265. __nv_sad

Prototype:

```
i32 @__nv_sad(i32 %, i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.266. __nv_saturatef

Prototype:

```
float @__nv_saturatef(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.267. __nv_scalbn

Prototype:

```
double @__nv_scalbn(double %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.268. __nv_scalbnf

Prototype:

```
float @__nv_scalbnf(float %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.269. __nv_signbitd

Prototype:

```
i32 @__nv_signbitd(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.270. __nv_signbitf

Prototype:

```
i32 @__nv_signbitf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.271. __nv_sin

Prototype:

```
double @__nv_sin(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.272. __nv_sincos

Prototype:

```
void @__nv_sincos(double %, double* %, double* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.273. __nv_sincosf

Prototype:

```
void @__nv_sincosf(float %, float* %, float* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.274. __nv_sincospi

Prototype:

```
void @__nv_sincospi(double %, double* %, double* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.275. __nv_sincospif

Prototype:

```
void @__nv_sincospif(float %, float* %, float* %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.276. __nv_sinf

Prototype:

```
float @__nv_sinf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.277. __nv_sinh

Prototype:

```
double @__nv_sinh(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.278. __nv_sinhf

Prototype:

```
float @__nv_sinhf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.279. __nv_sinpi

Prototype:

```
double @__nv_sinpi(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.280. __nv_sinpif

Prototype:

```
float @__nv_sinpif(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.281. __nv_sqrt

Prototype:

```
double @__nv_sqrt(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.282. __nv_sqrtf

Prototype:

```
float @__nv_sqrtf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.283. __nv_tan

Prototype:

```
double @__nv_tan(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.284. __nv_tanf

Prototype:

```
float @__nv_tanf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.285. __nv_tanh

Prototype:

```
double @__nv_tanh(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.286. __nv_tanhf

Prototype:

```
float @__nv_tanhf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.287. __nv_tgamma

Prototype:

```
double @__nv_tgamma(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.288. __nv_tgammaf

Prototype:

```
float @__nv_tgammaf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.289. __nv_trunc

Prototype:

```
double @__nv_trunc(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.290. __nv_truncf

Prototype:

```
float @__nv_truncf(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.291. __nv_uhadd

Prototype:

```
i32 @__nv_uhadd(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.292. __nv_uint2double_rn

Prototype:

```
double @__nv_uint2double_rn(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.293. __nv_uint2float_rd

Prototype:

```
float @__nv_uint2float_rd(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.294. __nv_uint2float_rn

Prototype:

```
float @__nv_uint2float_rn(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.295. __nv_uint2float_ru

Prototype:

```
float @__nv_uint2float_ru(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.296. __nv_uint2float_rz

Prototype:

```
float @__nv_uint2float_rz(i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.297. __nv_ull2double_rd

Prototype:

```
double @__nv_ull2double_rd(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.298. __nv_ull2double_rn

Prototype:

```
double @__nv_ull2double_rn(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.299. __nv_ull2double_ru

Prototype:

```
double @__nv_ull2double_ru(i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.300. __nv_ull2double_rz

Prototype:

```
double @__nv_ull2double_rz(i64 %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.301. __nv_ull2float_rd

Prototype:

```
float @__nv_ull2float_rd(i64 %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.302. __nv_ull2float_rn

Prototype:

```
float @__nv_ull2float_rn(i64 %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.303. __nv_ull2float_ru

Prototype:

```
float @__nv_ull2float_ru(i64 %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.304. __nv_ull2float_rz

Prototype:

```
float @__nv_ull2float_rz(i64 %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.305. __nv_ullmax

Prototype:

```
i64 @__nv_ullmax(i64 %, i64 %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.306. __nv_ullmin

Prototype:

```
i64 @__nv_ullmin(i64 %, i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.307. __nv_umax

Prototype:

```
i32 @__nv_umax(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.308. __nv_umin

Prototype:

```
i32 @__nv_umin(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.309. __nv_umul24

Prototype:

```
i32 @__nv_umul24(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.310. __nv_umul64hi

Prototype:

```
i64 @__nv_umul64hi(i64 %, i64 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.311. __nv_umulhi

Prototype:

```
i32 @__nv_umulhi(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.312. __nv_urhadd

Prototype:

```
i32 @__nv_urhadd(i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.313. __nv_usad

Prototype:

```
i32 @__nv_usad(i32 %, i32 %, i32 %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.314. __nv_y0

Prototype:

```
double @__nv_y0(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.315. __nv_y0f

Prototype:

```
float @__nv_y0f(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.316. __nv_y1

Prototype:

```
double @__nv_y1(double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.317. __nv_y1f

Prototype:

```
float @__nv_y1f(float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.318. __nv_yn

Prototype:

```
double @__nv_yn(i32 %, double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.319. __nv_ynf

Prototype:

```
float @__nv_ynf(i32 %, float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

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