



LIBDEVICE USER'S GUIDE

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PREFACE

Preface

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
nvvmProgramAddModule(prog, libdeviceMod, libdeviceModSize);

// Add custom IR to program
nvvmProgramAddModule(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).

2.2 Selecting Library Version

The libdevice library ships with several versions, each tuned for optimal performance on a particular device architecture. The following table provides a guideline for choosing the best libdevice version for the target architecture. All versions can be found in the CUDA Toolkit under `nvvm/libdevice/<library-name>`.

Table 2 Library version selection guidelines

Compute Capability	Library
$2.0 \leq \text{Arch} < 3.0$	<code>libdevice.compute_20.XX.bc</code>
<code>Arch = 3.0</code>	<code>libdevice.compute_30.XX.bc</code>
$3.1 \leq \text{Arch} < 3.5$	<code>libdevice.compute_20.XX.bc</code>
<code>Arch = 3.5</code>	<code>libdevice.compute_35.XX.bc</code>

The XX in the library name corresponds to the libdevice library release number. Each release of the libdevice library will have a new revision number.

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_expm1f

Prototype:

```
float @__nv_expm1f(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_fdivide

Prototype:

```
double @__nv_fdivide(double %, double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.118 __nv_fdividef

Prototype:

```
float @__nv_fdividef(float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.119 __nv_ffs

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.120 `__nv_ffsll`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.121 `__nv_finitef`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.122 `__nv_float2half_rn`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.123 __nv_float2int_rd

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.124 __nv_float2int_rn

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.125 __nv_float2int_ru

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.126 __nv_float2int_rz

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.127 __nv_float2ll_rd

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.128 __nv_float2ll_rn

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.129 __nv_float2ll_ru

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.130 __nv_float2ll_rz

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.131 __nv_float2uint_rd

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.132 __nv_float2uint_rn

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.133 __nv_float2uint_ru

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.134 __nv_float2uint_rz

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.135 __nv_float2ull_rd

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.136 __nv_float2ull_rn

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.137 __nv_float2ull_ru

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.138 `__nv_float2ull_rz`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.139 `__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

3.140 `__nv_floor`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.141 __nv_floorf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.142 __nv_fma

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.143 __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

3.144 __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

3.145 __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

3.146 __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

3.147 __nv_fmaf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.148 __nv_fmaf_ieee_rd

Prototype:

```
float @__nv_fmaf_ieee_rd(float %, float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.149 __nv_fmaf_ieee_rn

Prototype:

```
float @__nv_fmaf_ieee_rn(float %, float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.150 __nv_fmaf_ieee_ru

Prototype:

```
float @__nv_fmaf_ieee_ru(float %, float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.151 __nv_fmaf_ieee_rz

Prototype:

```
float @__nv_fmaf_ieee_rz(float %, float %, float %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.152 __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

3.153 __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

3.154 __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

3.155 __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

3.156 __nv_fmax

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.157 __nv_fmaxf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.158 __nv_fmin

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.159 `__nv_fminf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.160 `__nv_fmod`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.161 `__nv_fmodf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.162 __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

3.163 __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

3.164 __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

3.165 __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

3.166 __nv_frcp_rd

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.167 __nv_frcp_rn

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.168 __nv_frcp_ru

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.169 __nv_frcp_rz

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.170 __nv_frexp

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.171 __nv_frexp

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.172 __nv_frsqrt_rn

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.173 __nv_fsqrt_rd

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.174 __nv_fsqrt_rn

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.175 __nv_fsqrt_ru

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.176 __nv_fsqrt_rz

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.177 __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

3.178 __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

3.179 __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

3.180 __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

3.181 __nv_hadd

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.182 __nv_half2float

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.183 `__nv_hiloint2double`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.184 `__nv_hypot`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.185 `__nv_hypotf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.186 __nv_ilogb

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.187 __nv_ilogbf

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.188 __nv_int2double_rn

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.189 __nv_int2float_rd

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.190 __nv_int2float_rn

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.191 __nv_int2float_ru

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.192 __nv_int2float_rz

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.193 __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

3.194 __nv_isfinited

Prototype:

```
i32 @__nv_isfinited(double %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.195 `__nv_isinfd`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.196 `__nv_isinff`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.197 `__nv_isnand`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.198 __nv_isnanf

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.199 __nv_j0

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.200 __nv_j0f

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.201 __nv_j1

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.202 __nv_j1f

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.203 __nv_jn

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.204 __nv_jnf

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.205 __nv_ldexp

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.206 __nv_ldexpf

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.207 __nv_lgamma

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.208 __nv_lgammaf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.209 __nv_ll2double_rd

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.210 __nv_ll2double_rn

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.211 __nv_ll2double_ru

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.212 __nv_ll2double_rz

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.213 __nv_ll2float_rd

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.214 __nv_ll2float_rn

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.215 __nv_ll2float_ru

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.216 __nv_ll2float_rz

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.217 __nv_llabs

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.218 __nv_llmax

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.219 __nv_llmin

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.220 __nv_llrint

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.221 __nv_llrintf

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.222 `__nv_llround`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.223 `__nv_llroundf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.224 `__nv_log`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.225 __nv_log10

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.226 __nv_log10f

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.227 __nv_log1p

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.228 __nv_log1pf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.229 __nv_log2

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.230 __nv_log2f

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.231 __nv_logb

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.232 __nv_logbf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.233 __nv_logf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.234 `__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

3.235 `__nv_max`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.236 `__nv_min`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.237 __nv_modf

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.238 __nv_modff

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.239 __nv_mul24

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.240 `__nv_mul64hi`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.241 `__nv_mulhi`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.242 `__nv_nan`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.243 `__nv_nanf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.244 `__nv_nearbyint`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.245 `__nv_nearbyintf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.246 __nv_nextafter

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.247 __nv_nextafterf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.248 __nv_normcdf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.249 `__nv_normcdfff`

Prototype:

```
float @__nv_normcdfff(float %)
```

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.250 `__nv_normcdfinv`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.251 `__nv_normcdfinvf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.252 __nv_popc

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.253 __nv_popc1l

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.254 __nv_pow

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.255 __nv_powf

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.256 __nv_powi

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.257 __nv_powif

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.258 __nv_rcbrt

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.259 __nv_rcbrtf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.260 __nv_rcp64h

Prototype:

```
double @__nv_rcp64h(double %)
```

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.261 __nv_remainder

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.262 __nv_remainderf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.263 __nv_remquo

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.264 __nv_remquof

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.265 __nv_rhadd

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.266 __nv_rint

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.267 __nv_rintf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.268 __nv_round

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.269 __nv_roundf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.270 __nv_rsqrt

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.271 __nv_rsqrtf

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.272 __nv_sad

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.273 `__nv_saturatef`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.274 `__nv_scalbn`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.275 `__nv_scalbnf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.276 __nv_signbitd

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.277 __nv_signbitf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.278 __nv_sin

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.279 `__nv_sincos`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.280 `__nv_sincosf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.281 `__nv_sincospi`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.282 `__nv_sincospif`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.283 `__nv_sinf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.284 `__nv_sinh`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.285 `__nv_sinhf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.286 `__nv_sinpi`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.287 `__nv_sinpif`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.288 `__nv_sqrt`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.289 `__nv_sqrtf`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.290 `__nv_tan`

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.291 __nv_tanf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.292 __nv_tanh

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.293 __nv_tanhf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.294 __nv_tgamma

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.295 __nv_tgammaf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.296 __nv_trunc

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.297 __nv_truncf

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.298 __nv_uhadd

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.299 __nv_uint2double_rn

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.300 __nv_uint2float_rd

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.301 __nv_uint2float_rn

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.302 __nv_uint2float_ru

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.303 `__nv_uint2float_rz`

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.304 `__nv_ull2double_rd`

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.305 `__nv_ull2double_rn`

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.306 __nv_ull2double_ru

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.307 __nv_ull2double_rz

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.308 __nv_ull2float_rd

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.309 __nv_ull2float_rn

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.310 __nv_ull2float_ru

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.311 __nv_ull2float_rz

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.312 __nv_ullmax

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.313 __nv_ullmin

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.314 __nv_umax

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.315 __nv_umin

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.316 __nv_umul24

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.317 __nv_umul64hi

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.318 __nv_umulhi

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.319 __nv_urhadd

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.320 __nv_usad

Prototype:

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

Description:

Library Availability:

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.321 `__nv_y0`

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.322 `__nv_y0f`

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.323 `__nv_y1`

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.324 __nv_y1f

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.325 __nv_yn

Prototype:

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

Description:**Library Availability:**

Compute 2.0: Yes

Compute 3.0: Yes

Compute 3.5: Yes

3.326 __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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