CM RTCESL 4.5 Release Notes

1   Overview

These release notes are for the ARM®
Cortex®-M0+, Cortex-M4(F), and Cortex-M7(F)
Real Time Control Embedded Software Libraries
release 4.5.

The purpose of this release is the MCUXpresso
IDE support and bug fixes.

Contents

2   What is new

The new features of this release are:

- Added the new library object files compiled by the MCUXpresso IDE (GCC compiler) for all platforms.
- Added the new library integration chapter to the documentation.
- Added new general structures:
  - GMCLIB_2COOR_AB_T_F16
  - GMCLIB_2COOR_AB_T_F32
  - GMCLIB_2COOR_AB_T_FLT

The bug fixes and optimizations are:

- Removed the redundant code in the GFLIB_Hyst_FLT function.

- The data type in the observer structure of the AMCLIB_PMSMBemfObsrvDQ_A32fff function is fixed.
- The A2Gain and K2Gain parameters are not multiplied by the PI constant in the
- AMCLIB_AngleTrackObsrv_A32ff
- function.
- The ThGain input and ThGain parameter are not multiplied by the PI constant in the AMCLIB_TrackObsrv_A32af function.
- Fixed warning – registers are not in the order of the GDFLIB_FilterIIR1_F16 function.
- For all or more functions:
  - Removed the redundant includes
  - Adjusted the inline optimization pragmas
  - Changed the RTCESL_cfg include locations

3   Description

This release of RTCESL supports these platforms:

- ARM Cortex M0+
- ARM Cortex M4(F)
- ARM Cortex M7(F)

It contains these libraries:

- MLIB
- GFLIB
- GDFLIB
- GMCLIB
- AMCLIB

- PCLIB

It is compiled on:

- MCUX 10.0.9_562 IDE
- KDS 3.2.0 IDE
- IAR 8.20.1.14188 IDE
- Keil 5.23.0.0 IDE

Optimization used:

- The accuracy is not guaranteed for some of the float functions in this version.
- The maximum speed optimization is used for all libraries on all compilers.
- The maximum balanced optimization is used for IAR CM4F and IAR CM7F because errors in the compilation with fpu.
- The GFLIB for CM0+, CM4(F), and CM7(F) was compiled with the Level 1 optimization in the Keil IDE, there were errors in the compilation.

This is the list of algorithms contained in the release for the CM4(F) and CM7(F) (fixed-point 16-/32-bit, 32-bit single precision floating-point):

```
AMCLIB_TrackObsrvInit_F16
AMCLIB_TrackObsrv_F16
AMCLIB_AngleTrackObsrvInit_F16
AMCLIB_AngleTrackObsrv_F16
AMCLIB_PMSMBemfObsrvDQInit_F16
AMCLIB_PMSMBemfObsrvDQ_F16
AMCLIB_PMSMBemfObsrvABInit_F16
AMCLIB_PMSMBemfObsrvAB_F16
AMCLIB_CtrlFluxWkngInit_F16
AMCLIB_CtrlFluxWkng_F16
AMCLIB_TrackObsrvInit_A32af
AMCLIB_TrackObsrv_A32af
AMCLIB_AngleTrackObsrvInit_A32
AMCLIB_AngleTrackObsrv_A32ff
AMCLIB_PMSMBemfObsrvDQInit_A32fff
AMCLIB_PMSMBemfObsrvDQ_A32fff
AMCLIB_PMSMBemfObsrvABInit_FLT
AMCLIB_PMSMBemfObsrvAB_FLT
AMCLIB_CtrlFluxWkngInit_FLT
AMCLIB_CtrlFluxWkng_FLT
AMCLIB_ACIMRotFluxObsrvInit_FLT
AMCLIB_ACIMRotFluxObsrv_FLT
AMCLIB_ACIMSpeedMRASInit_FLT
AMCLIB_ACIMSpeedMRAS_FLT
AMCLIB_ACIMCtrlMTPAInit_FLT
AMCLIB_ACIMCtrlMTPA_FLT

GDFLIB_FilterMAInit_F16
GDFLIB_FilterMA_F16
GDFLIB_FilterIIR1Init_F16
GDFLIB_FilterIIR1_F16
GDFLIB_FilterIIR2Init_F16
GDFLIB_FilterIIR2_F16
GDFLIB_FilterIIR3Init_F16
GDFLIB_FilterIIR3_F16
GDFLIB_FilterIIR4Init_F16
GDFLIB_FilterIIR4_F16
GDFLIB_FilterExpInit_F16
GDFLIB_FilterExp_F16
GDFLIB_FilterMAInit_FLT
GDFLIB_FilterMA_FLT
GDFLIB_FilterIIR1Init_FLT
GDFLIB_FilterIIR1_FLT
GDFLIB_FilterIIR2Init_FLT
GDFLIB_FilterIIR2_FLT
GDFLIB_FilterIIR3Init_FLT
GDFLIB_FilterIIR3_FLT
GDFLIB_FilterIIR4Init_FLT
GDFLIB_FilterIIR4_FLT
GDFLIB_FilterExpInit_FLT
```

```
GDFLIB_FilterExp_FLT

GFLIB_Acos_F16
GFLIB_Asin_F16
GFLIB_Atan_F16
GFLIB_AtanYX_F16
GFLIB_Cos_F16
GFLIB_CtrlBetaIPpAWInit_F16
GFLIB_CtrlBetaIPpAW_F16
GFLIB_CtrlBetaIPDpAWInit_F16
GFLIB_CtrlBetaIPDpAW_F16
GFLIB_CtrlPIpAWInit_F16
GFLIB_CtrlPIpAW_F16
GFLIB_CtrlPIDpAWInit_F16
GFLIB_CtrlPIDpAW_F16
GFLIB_DFlexRampInit_F16
GFLIB_DFlexRampCalcIncr_F16
GFLIB_DFlexRamp_F16
GFLIB_DRampInit_F16
GFLIB_DRamp_F16
GFLIB_DRampInit_F32
GFLIB_DRamp_F32
GFLIB_FlexRampInit_F16
GFLIB_FlexRampCalcIncr_F16
GFLIB_FlexRamp_F16
GFLIB_FlexSRampInit_F16
GFLIB_FlexSRampCalcIncr_F16
GFLIB_FlexSRamp_F16
GFLIB_Hyst_F16
GFLIB_IntegratorInit_F16
GFLIB_Integrator_F16
GFLIB_Limit_F16
GFLIB_Limit_F32
GFLIB_LowerLimit_F16
GFLIB_LowerLimit_F32
GFLIB_Lut1D_F16
GFLIB_Lut1D_F32
GFLIB_LutPer1D_F16
GFLIB_LutPer1D_F32
GFLIB_RampInit_F16
GFLIB_Ramp_F16
GFLIB_RampInit_F32
GFLIB_Ramp_F32
GFLIB_Sin_F16
GFLIB_Sqrt_F16
GFLIB_Sqrt_F16l
GFLIB_Tan_F16
GFLIB_UpperLimit_F16
GFLIB_UpperLimit_F32
GFLIB_VectorLimit_F16
```

```
GFLIB_VectorLimit1_F16                          GMCLIB_ElimDcBusRip_F16fff
GFLIB_Acos_FLT                                  GMCLIB_ElimDcBusRip_F16sas
GFLIB_Asin_FLT                                  GMCLIB_ParkInv_F16
GFLIB_AtanYX_FLT                                GMCLIB_ParkInv_FLT
GFLIB_AtanYX_A32f                               GMCLIB_Park_F16
GFLIB_Atan_FLT                                  GMCLIB_Park_FLT
GFLIB_Atan_A32f                                 GMCLIB_SvmDpwm_F16
GFLIB_Cos_FLT                                   GMCLIB_SvmExDpwm_F16
GFLIB_Cos_FLTa                                  GMCLIB_SvmIct_F16
GFLIB_CtrlBetaIPpAWInit_FLT                     GMCLIB_SvmStd_F16
GFLIB_CtrlBetaIPpAW_FLT                         GMCLIB_SvmU0n_F16
GFLIB_CtrlBetaIPDpAWInit_FLT                    GMCLIB_SvmU7n_F16
GFLIB_CtrlBetaIPDpAW_FLT
GFLIB_CtrlPIDpAWInit_FLT                        MLIB_AbsSat_F16
GFLIB_CtrlPIDpAW_FLT                            MLIB_AbsSat_F32
GFLIB_CtrlPIpAWInit_FLT                         MLIB_Abs_F16
GFLIB_CtrlPIpAW_FLT                             MLIB_Abs_F32
GFLIB_DFlexRampInit_FLT                         MLIB_Abs_FLT
GFLIB_DFlexRampCalcIncr_FLT                     MLIB_Add4Sat_F16
GFLIB_DFlexRamp_FLT                             MLIB_Add4Sat_F32
GFLIB_DRampInit_FLT                             MLIB_Add4_F16
GFLIB_DRamp_FLT                                 MLIB_Add4_F32
GFLIB_FlexRampInit_FLT                          MLIB_Add4_FLT
GFLIB_FlexRampCalcIncr_FLT                      MLIB_AddSat_F16
GFLIB_FlexRamp_FLT                              MLIB_AddSat_F32
GFLIB_FlexSRampInit_FLT                         MLIB_Add_A32as
GFLIB_FlexSRampCalcIncr_FLT                     MLIB_Add_A32ss
GFLIB_FlexSRamp_FLT                             MLIB_Add_F16
GFLIB_Hyst_FLT                                  MLIB_Add_F32
GFLIB_IntegratorInit_FLT                        MLIB_Add_FLT
GFLIB_Integrator_FLT                            MLIB_Clb_U16l
GFLIB_Limit_FLT                                 MLIB_Clb_U16s
GFLIB_LowerLimit_FLT                            MLIB_ConvSc_A32ff
GFLIB_Lut1DInit_FLT                             MLIB_ConvSc_F16ff
GFLIB_Lut1D_FLT                                 MLIB_ConvSc_F32ff
GFLIB_LutPer1DInit_FLT                          MLIB_ConvSc_FLTaf
GFLIB_LutPer1D_FLT                              MLIB_ConvSc_FLTlf
GFLIB_RampInit_FLT                              MLIB_ConvSc_FLTsf
GFLIB_Ramp_FLT                                  MLIB_Conv_A32f
GFLIB_Sin_FLT                                   MLIB_Conv_F16f
GFLIB_Sin_FLTa                                  MLIB_Conv_F16l
GFLIB_Sqrt_FLT                                  MLIB_Conv_F32f
GFLIB_Tan_FLT                                   MLIB_Conv_F32s
GFLIB_Tan_FLTa                                  MLIB_Conv_FLTa
GFLIB_UpperLimit_FLT                            MLIB_Conv_FLTl
GFLIB_VectorLimit_FLT                           MLIB_Conv_FLTs
GFLIB_VectorLimit1_FLT                          MLIB_Div1QSat_A32as
                                                MLIB_Div1QSat_F16
GMCLIB_ClarkInv_F16                             MLIB_Div1QSat_F16ll
GMCLIB_ClarkInv_FLT                             MLIB_Div1QSat_F16ls
GMCLIB_Clark_F16                                MLIB_Div1QSat_F32
GMCLIB_Clark_FLT                                MLIB_Div1QSat_F32ls
GMCLIB_DecouplingPMSM_F16                       MLIB_Div1Q_A32as
GMCLIB_DecouplingPMSM_FLT                       MLIB_Div1Q_A32ll
GMCLIB_ElimDcBusRipFOC_F16                      MLIB_Div1Q_A32ls
GMCLIB_ElimDcBusRipFOC_F16ff                    MLIB_Div1Q_A32ss
```

CM RTCESL 4.5 Release Notes, Rev. 0 NXP Semiconductors

```
MLIB_Div1Q_F16                      MLIB_Mac4Sat_F32ssss
MLIB_Div1Q_F16ll                    MLIB_Mac4_F32ssss
MLIB_Div1Q_F16ls                    MLIB_Mac4_FLT
MLIB_Div1Q_F32                      MLIB_MacRndSat_F16
MLIB_Div1Q_F32ls                    MLIB_MacRndSat_F32
MLIB_DivHw1QSat_F16                 MLIB_MacRndSat_F32lls
MLIB_DivHw1QSat_F16ll               MLIB_MacRnd_A32ass
MLIB_DivHw1QSat_F16ls               MLIB_MacRnd_F16
MLIB_DivHw1QSat_F32                 MLIB_MacRnd_F32
MLIB_DivHw1QSat_F32ls               MLIB_MacRnd_F32lls
MLIB_DivHw1QSat_F32ls               MLIB_MacSat_F16
MLIB_DivHw1Q_A32ll                  MLIB_MacSat_F32
MLIB_DivHw1Q_A32ls                  MLIB_MacSat_F32lss
MLIB_DivHw1Q_A32ss                  MLIB_Mac_A32ass
MLIB_DivHw1Q_F16                    MLIB_Mac_F16
MLIB_DivHw1Q_F16ll                  MLIB_Mac_F32
MLIB_DivHw1Q_F16ls                  MLIB_Mac_F32lss
MLIB_DivHw1Q_F32                    MLIB_Mac_FLT
MLIB_DivHw1Q_F32ls                  MLIB_MnacRndSat_F16
MLIB_DivHw1Q_F32ls                  MLIB_MnacRndSat_F32
MLIB_DivHwSat_F16                   MLIB_MnacRndSat_F32lls
MLIB_DivHwSat_F16ll                 MLIB_MnacRnd_A32ass
MLIB_DivHwSat_F16ls                 MLIB_MnacRnd_F16
MLIB_DivHwSat_F32                   MLIB_MnacRnd_F32
MLIB_DivHwSat_F32ls                 MLIB_MnacRnd_F32lls
MLIB_DivHwSat_F32ls                 MLIB_MnacSat_F16
MLIB_DivHw_A32ll                    MLIB_MnacSat_F32
MLIB_DivHw_A32ls                    MLIB_MnacSat_F32lss
MLIB_DivHw_A32ss                    MLIB_Mnac_A32ass
MLIB_DivHw_F16                      MLIB_Mnac_F16
MLIB_DivHw_F16ll                    MLIB_Mnac_F32
MLIB_DivHw_F16ls                    MLIB_Mnac_F32lss
MLIB_DivHw_F32                      MLIB_Mnac_FLT
MLIB_DivHw_F32ls                    MLIB_Msu4RndSat_F16
MLIB_DivHw_F32ls                    MLIB_Msu4RndSat_F32
MLIB_DivSat_A32as                   MLIB_Msu4Rnd_F16
MLIB_DivSat_F16                     MLIB_Msu4Rnd_F32
MLIB_DivSat_F16ll                   MLIB_Msu4Sat_F32ssss
MLIB_DivSat_F16ls                   MLIB_Msu4_F32ssss
MLIB_DivSat_F32                     MLIB_Msu4_FLT
MLIB_DivSat_F32ls                   MLIB_MsuRndSat_F16
MLIB_Div_A32as                      MLIB_MsuRndSat_F32
MLIB_Div_A32ll                      MLIB_MsuRndSat_F32lls
MLIB_Div_A32ls                      MLIB_MsuRnd_A32ass
MLIB_Div_A32ss                      MLIB_MsuRnd_F16
MLIB_Div_F16                        MLIB_MsuRnd_F32
MLIB_Div_F16ll                      MLIB_MsuRnd_F32lls
MLIB_Div_F16ls                      MLIB_MsuSat_F16
MLIB_Div_F32                        MLIB_MsuSat_F32
MLIB_Div_F32ls                      MLIB_MsuSat_F32lss
MLIB_Div_FLT                        MLIB_Msu_A32ass
MLIB_Log2_U16                       MLIB_Msu_F16
MLIB_Mac4RndSat_F16                 MLIB_Msu_F32
MLIB_Mac4RndSat_F32                 MLIB_Msu_F32lss
MLIB_Mac4Rnd_F16                    MLIB_Msu_FLT
MLIB_Mac4Rnd_F32                    MLIB_MulNegRndSat_A32
```

```
MLIB_MulNegRndSat_F16as          MLIB_Sat_F16a
MLIB_MulNegRnd_A32               MLIB_Sh1LSat_F16
MLIB_MulNegRnd_F16               MLIB_Sh1LSat_F32
MLIB_MulNegRnd_F16as             MLIB_Sh1L_F16
MLIB_MulNegRnd_F32               MLIB_Sh1L_F32
MLIB_MulNegRnd_F32ls             MLIB_Sh1R_F16
MLIB_MulNegSat_A32               MLIB_Sh1R_F32
MLIB_MulNegSat_F16as             MLIB_ShLBiSat_F16
MLIB_MulNeg_A32                  MLIB_ShLBiSat_F32
MLIB_MulNeg_F16                  MLIB_ShLBi_F16
MLIB_MulNeg_F16as                MLIB_ShLBi_F32
MLIB_MulNeg_F32                  MLIB_ShLSat_F16
MLIB_MulNeg_F32ss                MLIB_ShLSat_F32
MLIB_MulNeg_FLT                  MLIB_ShL_F16
MLIB_MulRndSat_A32               MLIB_ShL_F32
MLIB_MulRndSat_F16               MLIB_ShRBiSat_F16
MLIB_MulRndSat_F16as             MLIB_ShRBiSat_F32
MLIB_MulRndSat_F32               MLIB_ShRBi_F16
MLIB_MulRndSat_F32ls             MLIB_ShRBi_F32
MLIB_MulRnd_A32                  MLIB_ShR_F16
MLIB_MulRnd_F16                  MLIB_ShR_F32
MLIB_MulRnd_F16as                MLIB_Sign_F16
MLIB_MulRnd_F32                  MLIB_Sign_F32
MLIB_MulRnd_F32ls                MLIB_Sign_FLT
MLIB_MulSat_A32                  MLIB_Sub4Sat_F16
MLIB_MulSat_F16                  MLIB_Sub4Sat_F32
MLIB_MulSat_F16as                MLIB_Sub4_F16
MLIB_MulSat_F32                  MLIB_Sub4_F32
MLIB_MulSat_F32ss                MLIB_Sub4_FLT
MLIB_Mul_A32                     MLIB_SubSat_F16
MLIB_Mul_F16                     MLIB_SubSat_F32
MLIB_Mul_F16as                   MLIB_Sub_A32as
MLIB_Mul_F32                     MLIB_Sub_A32ss
MLIB_Mul_F32ss                   MLIB_Sub_F16
MLIB_Mul_FLT                     MLIB_Sub_F32
MLIB_NegSat_F16                  MLIB_Sub_FLT
MLIB_NegSat_F32
MLIB_Neg_F16                     PCLIB_Ctrl2P2ZInit_F16
MLIB_Neg_F32                     PCLIB_Ctrl2P2Z_F16
MLIB_Neg_FLT                     PCLIB_Ctrl3P3ZInit_F16
MLIB_Rcp1Q_A32s                  PCLIB_Ctrl3P3Z_F16
MLIB_Rcp1_A32s                   PCLIB_CtrlPIInit_F16
MLIB_RcpHw1Q_A32s                PCLIB_CtrlPI_F16
MLIB_RcpHw1_A32s                 PCLIB_CtrlPIandLPInit_F16
MLIB_RcpHw_A32s                  PCLIB_CtrlPIandLP_F16
MLIB_Rcp_A32s                    PCLIB_CtrlPIDInit_F16
MLIB_RndSat_F16l                 PCLIB_CtrlPID_F16
MLIB_Rnd_F16l
```

This is the list of algorithms contained in the release for CM0+ (fixed-point 16- and 32-bit):

```
AMCLIB_TrackObsrvInit_F16        AMCLIB_AngleTrackObsrv_F16
AMCLIB_TrackObsrv_F16            AMCLIB_PMSMBemfObsrvDQInit_F16
AMCLIB_AngleTrackObsrvInit_F16   AMCLIB_PMSMBemfObsrvDQ_F16
```

```
AMCLIB_PMSMBemfObsrvABInit_F16          GMCLIB_ParkInv_F16
AMCLIB_PMSMBemfObsrvAB_F16              GMCLIB_DecouplingPMSM_F16
AMCLIB_CtrlFluxWkngInit_F16            GMCLIB_ElimDcBusRipFOC_F16
AMCLIB_CtrlFluxWkng_F16                GMCLIB_ElimDcBusRip_F16sas
                                        GMCLIB_SvmStd_F16
GDFLIB_FilterMAInit_F16                GMCLIB_SvmIct_F16
GDFLIB_FilterMA_F16                    GMCLIB_SvmU0n_F16
GDFLIB_FilterIIR1Init_F16              GMCLIB_SvmU7n_F16
GDFLIB_FilterIIR1_F16                  GMCLIB_SvmDpwm_F16
GDFLIB_FilterIIR2Init_F16              GMCLIB_SvmExDpwm_F16
GDFLIB_FilterIIR2_F16
GDFLIB_FilterExpInit_F16
GDFLIB_FilterExp_F16                   MLIB_AbsSat_F16
                                        MLIB_AbsSat_F32
                                        MLIB_Abs_F16
GFLIB_Atan_F16                         MLIB_Abs_F32
GFLIB_AtanYX_F16                       MLIB_Add4Sat_F16
GFLIB_Cos_F16                          MLIB_Add4Sat_F32
GFLIB_CtrlBetaIPpAWInit_F16            MLIB_Add4_F16
GFLIB_CtrlBetaIPpAW_F16                MLIB_Add4_F32
GFLIB_CtrlPIpAWInit_F16                MLIB_AddSat_F16
GFLIB_CtrlPIpAW_F16                    MLIB_AddSat_F32
GFLIB_DFlexRampInit_F16                MLIB_Add_A32as
GFLIB_DFlexRampCalcIncr_F16            MLIB_Add_A32ss
GFLIB_DFlexRamp_F16                    MLIB_Add_F16
GFLIB_DRampInit_F16                    MLIB_Add_F32
GFLIB_DRamp_F16                        MLIB_Clb_U16l
GFLIB_DRampInit_F32                    MLIB_Clb_U16s
GFLIB_DRamp_F32                        MLIB_Conv_F16l
GFLIB_FlexRampInit_F16                 MLIB_Conv_F32s
GFLIB_FlexRampCalcIncr_F16             MLIB_Div1QSat_A32as
GFLIB_FlexRamp_F16                     MLIB_Div1QSat_F16
GFLIB_Hyst_F16                         MLIB_Div1QSat_F16ll
GFLIB_IntegratorInit_F16               MLIB_Div1QSat_F16ls
GFLIB_Integrator_F16                   MLIB_Div1QSat_F32
GFLIB_Limit_F16                        MLIB_Div1QSat_F32ls
GFLIB_Limit_F32                        MLIB_Div1Q_A32as
GFLIB_LowerLimit_F16                   MLIB_Div1Q_A32ll
GFLIB_LowerLimit_F32                   MLIB_Div1Q_A32ls
GFLIB_Lut1D_F16                        MLIB_Div1Q_A32ss
GFLIB_Lut1D_F32                        MLIB_Div1Q_F16
GFLIB_LutPer1D_F16                     MLIB_Div1Q_F16ll
GFLIB_LutPer1D_F32                     MLIB_Div1Q_F16ls
GFLIB_RampInit_F16                     MLIB_Div1Q_F32
GFLIB_Ramp_F16                         MLIB_Div1Q_F32ls
GFLIB_RampInit_F32                     MLIB_DivSat_A32as
GFLIB_Ramp_F32                         MLIB_DivSat_F16
GFLIB_Sin_F16                          MLIB_DivSat_F16ll
GFLIB_Sqrt_F16                         MLIB_DivSat_F16ls
GFLIB_Sqrt_F16l                        MLIB_DivSat_F32
GFLIB_UpperLimit_F16                   MLIB_DivSat_F32ls
GFLIB_UpperLimit_F32                   MLIB_Div_A32as
GFLIB_VectorLimit1_F16                 MLIB_Div_A32ll
                                        MLIB_Div_A32ls
GMCLIB_Clark_F16                       MLIB_Div_A32ss
GMCLIB_ClarkInv_F16                    MLIB_Div_F16
GMCLIB_Park_F16                        MLIB_Div_F16ll
```

```
MLIB_Div_F16ls                 MLIB_Msu_F32
MLIB_Div_F32                   MLIB_Msu_F32lss
MLIB_Div_F32ls                 MLIB_MulNegRndSat_A32
MLIB_Log2_U16                  MLIB_MulNegRndSat_F16as
MLIB_Mac4RndSat_F16            MLIB_MulNegRnd_A32
MLIB_Mac4RndSat_F32            MLIB_MulNegRnd_F16
MLIB_Mac4Rnd_F16               MLIB_MulNegRnd_F16as
MLIB_Mac4Rnd_F32               MLIB_MulNegRnd_F32
MLIB_Mac4Sat_F32ssss           MLIB_MulNegRnd_F32ls
MLIB_Mac4_F32ssss              MLIB_MulNegSat_A32
MLIB_MacRndSat_F16             MLIB_MulNegSat_F16as
MLIB_MacRndSat_F32             MLIB_MulNeg_A32
MLIB_MacRndSat_F32lls          MLIB_MulNeg_F16
MLIB_MacRnd_A32ass             MLIB_MulNeg_F16as
MLIB_MacRnd_F16                MLIB_MulNeg_F32
MLIB_MacRnd_F32                MLIB_MulNeg_F32ss
MLIB_MacRnd_F32lls             MLIB_MulRndSat_A32
MLIB_MacSat_F16                MLIB_MulRndSat_F16
MLIB_MacSat_F32                MLIB_MulRndSat_F16as
MLIB_MacSat_F32lss             MLIB_MulRndSat_F32
MLIB_Mac_A32ass                MLIB_MulRndSat_F32ls
MLIB_Mac_F16                   MLIB_MulRnd_A32
MLIB_Mac_F32                   MLIB_MulRnd_F16
MLIB_Mac_F32lss                MLIB_MulRnd_F16as
MLIB_MnacRndSat_F16            MLIB_MulRnd_F32
MLIB_MnacRndSat_F32            MLIB_MulRnd_F32ls
MLIB_MnacRndSat_F32lls         MLIB_MulSat_A32
MLIB_MnacRnd_A32ass            MLIB_MulSat_F16
MLIB_MnacRnd_F16               MLIB_MulSat_F16as
MLIB_MnacRnd_F32               MLIB_MulSat_F32
MLIB_MnacRnd_F32lls            MLIB_MulSat_F32ss
MLIB_MnacSat_F16               MLIB_Mul_A32
MLIB_MnacSat_F32               MLIB_Mul_F16
MLIB_MnacSat_F32lss            MLIB_Mul_F16as
MLIB_Mnac_A32ass               MLIB_Mul_F32
MLIB_Mnac_F16                  MLIB_Mul_F32ss
MLIB_Mnac_F32                  MLIB_NegSat_F16
MLIB_Mnac_F32lss              MLIB_NegSat_F32
MLIB_Msu4RndSat_F16            MLIB_Neg_F16
MLIB_Msu4RndSat_F32            MLIB_Neg_F32
MLIB_Msu4Rnd_F16              MLIB_Rcp1Q_A32s
MLIB_Msu4Rnd_F32              MLIB_Rcp1_A32s
MLIB_Msu4Sat_F32ssss          MLIB_Rcp_A32s
MLIB_Msu4_F32ssss             MLIB_RndSat_F16l
MLIB_MsuRndSat_F16            MLIB_Rnd_F16l
MLIB_MsuRndSat_F32            MLIB_Sat_F16a
MLIB_MsuRndSat_F32lls         MLIB_Sh1LSat_F16
MLIB_MsuRnd_A32ass            MLIB_Sh1LSat_F32
MLIB_MsuRnd_F16              MLIB_Sh1L_F16
MLIB_MsuRnd_F32              MLIB_Sh1L_F32
MLIB_MsuRnd_F32lls            MLIB_Sh1R_F16
MLIB_MsuSat_F16              MLIB_Sh1R_F32
MLIB_MsuSat_F32              MLIB_ShLBiSat_F16
MLIB_MsuSat_F32lss            MLIB_ShLBiSat_F32
MLIB_Msu_A32ass              MLIB_ShLBi_F16
MLIB_Msu_F16                 MLIB_ShLBi_F32
```

```
MLIB_ShLSat_F16
MLIB_ShLSat_F32
MLIB_ShL_F16
MLIB_ShL_F32
MLIB_ShRBiSat_F16
MLIB_ShRBiSat_F32
MLIB_ShRBi_F16
MLIB_ShRBi_F32
MLIB_ShR_F16
MLIB_ShR_F32
MLIB_Sign_F16
MLIB_Sign_F32
MLIB_Sub4Sat_F16
MLIB_Sub4Sat_F32
MLIB_Sub4_F16
MLIB_Sub4_F32
MLIB_SubSat_F16
MLIB_SubSat_F32
MLIB_Sub_A32as
MLIB_Sub_A32ss
MLIB_Sub_F16
MLIB_Sub_F32

PCLIB_Ctrl2P2ZInit_F16
PCLIB_Ctrl2P2Z_F16
PCLIB_Ctrl3P3ZInit_F16
PCLIB_Ctrl3P3Z_F16
PCLIB_CtrlPIInit_F16
PCLIB_CtrlPI_F16
PCLIB_CtrlPIandLPInit_F16
PCLIB_CtrlPIandLP_F16
```

ARM POWERED

freescale