

CN20022: Ongoing Software Quality Testing on Libero SoC Has Found a Static Timing Analysis (STA) Coverage Issue for Specific Scenarios for SmartFusion2, IGLOO2, RTG4, and PolarFire Product Families

November 19, 2020

Description

With Libero SoC v12.5, Libero SoC v12.5 SP1, and Libero SoC v11.9 SP6, netlist tie-off information is now correctly being passed to SmartTime for a complete static timing analysis.

Reason for Change

Post-Layout timing database information for combinational cells inputs with constant tie-offs ("1" or "0") was incorrectly passed to SmartTime, preventing complete analysis of the path through the combinational cell.

Application Impact

CFGs (post-layout macros used to implement combinational logic function) inferred by SynplifyPro synthesis are always optimized, and are not impacted by this issue. Special cases that can allow a constant tie-off to exist in post-synthesis netlist for all affected product families are listed below:

- Directly instantiated with tie-offs ("1" or "0") on some of the inputs.
- A block component with input ports driving combinational cells is instantiated in a top-level design, and the top-level design ties the combinational cell input to a constant ("1" or "0").
- The use of synthesis compile points and/or other synthesis directives prevent the input tie-offs ("1" or "0") from being optimized out.
- Carry-chains inferred by Synthesis with constant inputs.

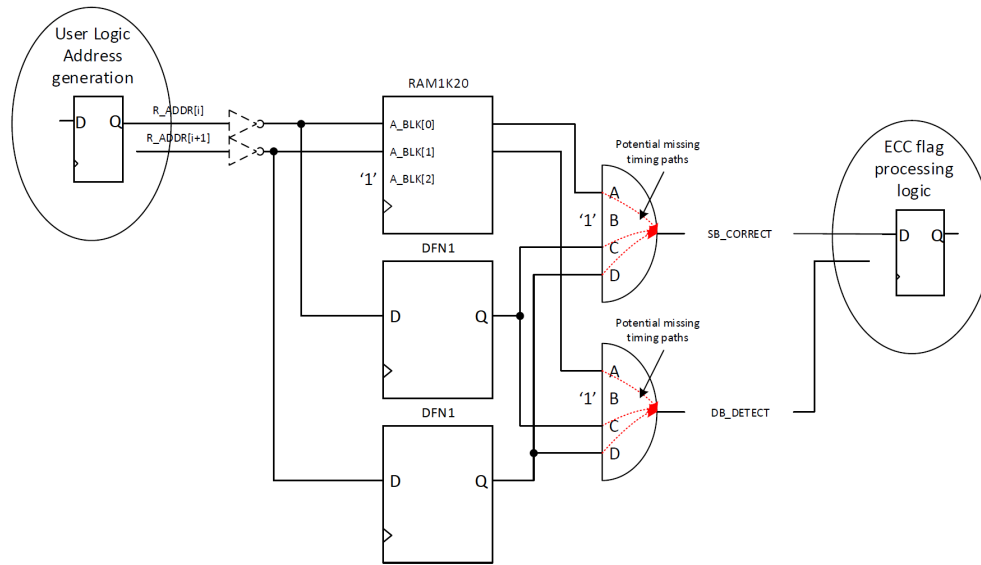
Additionally, for SmartFusion2 and IGLOO2, a separate issue was found:

- Timing on certain paths through the D-pin of carry-chains may be incorrect.
 - No performance degradation was observed on regression suites. In fact, the existing timing used for STA was more pessimistic, and after correcting the issue, the timing path had increased slack.

Additionally, for PolarFire, combinational cells tie-offs ("1" or "0") can also occur when:

- Generated logic for SB_CORRECT and DB_DETECT flags when ECC is enabled in LSRAMs with read address depth between 513 and 2048.
 - Affected cores:
 - PolarFire Two-Port Large SRAM
 - PolarFire SRAM (AHBL and AXI)
 - CoreFIFO

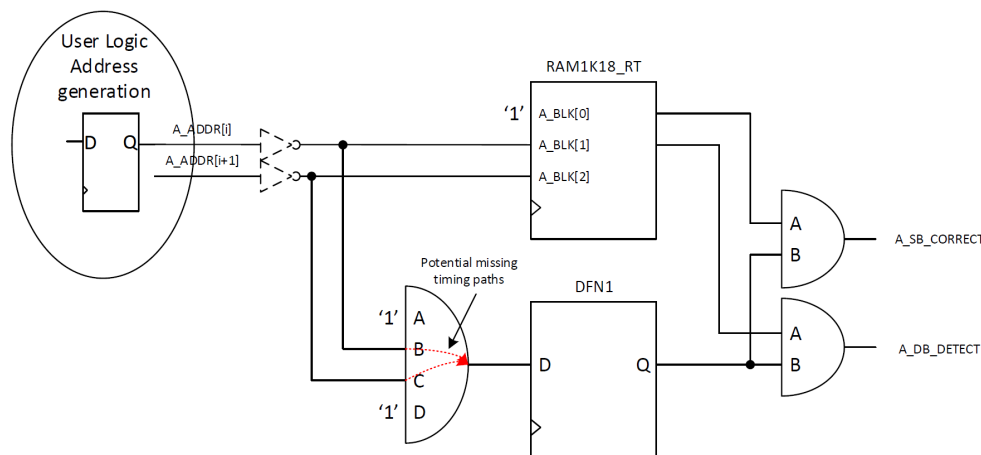
Figure 1 • PolarFire SRAM ECC Flag Generation Logic Example



Additionally, for RTG4, combinational cells tie-offs ("1" or "0") can also occur when:

- SerDes and FDDR cores are used in the design. The connection to the APB configuration interface contains 1-level of directly instantiated combinational logic containing constant tie-offs.
 - The missing timing paths on the APB configuration interface are not likely to be timing critical due to the large clock period on this bus.
- Generated logic for SB_CORRECT and DB_DETECT flags when ECC is enabled in SRAM.
 - The missing timing paths on the generated ECC flags are not likely to be timing critical due to the fact that the DFN1 (in Figure 2) has a much shorter setup time than the SRAM and timing driven place and route is fully cognizant of the timing in this scenario.
 - Affected cores:
 - RTG4 Dual-Port Large SRAM
 - RTG4 Two-Port Large SRAM
 - RTG4 Micro SRAM with read address depth between 65 and 128
 - RTG4 SRAM (AHBL and AXI)
 - CoreFIFO

Figure 2 • RTG4 SRAM ECC Flag Generation Logic Example



Summary

Microchip regression suite of designs exhibited no performance impact to the “tie-off” issue across all product families. In addition, there have been no reported failures due to this issue on any product since the introduction of SmartFusion2 and IGLOO2 in 2013, PolarFire in 2017, and RTG4 in 2015.

- Timing Driven Place and Route is not affected by this issue and correctly optimizes all paths against the constraints.
- The resulting programming bitstream is functionally correct, and there is no configuration error.
- The defect is limited to missed paths during STA when the scenarios described exists on the path.
- Tests using Microchip regression suites of fabric-only designs indicate that less than 0.003% of pins may be missing from SmartTime.

Action Required

- IGLOO2, SmartFusion2, and PolarFire: Commercial and Industrial Temperature Grades
 - No action is required on your part for completed designs that have no negative timing slack.
- IGLOO2, SmartFusion2, and PolarFire: Military, Automotive Temperature Grades and RTG4
 - No action is required for completed designs that have no negative timing slack and successfully passed full system functional testing on every production unit over the entire operating conditions.
- Ongoing or new designs must upgrade to the following software versions with the fix:
 - Libero SoC v12.5 and later, or Libero SoC v11.9 SP6 for RTG4 and PolarFire.
 - Libero SoC v12.5 SP1, or Libero SoC v11.9 SP6 for SmartFusion2 and IGLOO2.

If you have any questions about this subject, contact Microsemi Technical Support department by using the support portal at <https://soc.microsemi.com/Portal/Default.aspx>

Products Affected

MCHP Part Number	DLA SMD Number
RT4G150-CG1657B	5962-1620801QXF
RT4G150-CG1657E	5962-1620805QXF
RT4G150-CG1657V	5962-1620809VXF
RT4G150-CG1657PROTO	
RT4G150-CG1657R	
RT4G150-CG1657M	
RT4G150-1CG1657B	5962-1620802QXF
RT4G150-1CG1657E	5962-1620806QXF
RT4G150-1CG1657V	5962-1620810VXF
RT4G150-1CG1657PROTO	
RT4G150-1CG1657R	
RT4G150-1CG1657M	
RT4G150L-CG1657B	5962-1620815QXF
RT4G150L-CG1657E	5962-1620818QXF

MCHP Part Number	DLA SMD Number
RT4G150L-CG1657V	5962-1620820VXF
RT4G150L-CG1657PROTO	
RT4G150L-CG1657R	
RT4G150L-CG1657M	
RT4G150-LG1657B	5962-1620803QZC
RT4G150-LG1657E	5962-1620807QZC
RT4G150-LG1657V	5962-1620811VZC
RT4G150-LG1657PROTO	
RT4G150-LG1657R	
RT4G150-LG1657M	
RT4G150-1LG1657B	5962-1620804QZC
RT4G150-1LG1657E	5962-1620808QZC
RT4G150-1LG1657V	5962-1620812VZC
RT4G150-1LG1657PROTO	
RT4G150-1LG1657R	
RT4G150-1LG1657M	
RT4G150L-LG1657B	5962-1620816QZC
RT4G150L-LG1657E	5962-1620819QZC
RT4G150L-LG1657V	5962-1620821VZC
RT4G150L-LG1657PROTO	
RT4G150L-LG1657R	
RT4G150L-LG1657M	
RT4G150-CQ352B	5962-1620813QYC
RT4G150-CQ352E	5962-1620822QYC
RT4G150-CQ352V	5962-1620825VYC
RT4G150-CQ352PROTO	
RT4G150-CQ352R	

MCHP Part Number	DLA SMD Number
RT4G150-CQ352M	
RT4G150-1CQ352B	5962-1620814QYC
RT4G150-1CQ352E	5962-1620823QYC
RT4G150-1CQ352V	5962-1620826VYC
RT4G150-1CQ352PROTO	
RT4G150-1CQ352R	
RT4G150-1CQ352M	
RT4G150L-CQ352B	5962-1620817QYC
RT4G150L-CQ352E	5962-1620824QYC
RT4G150L-CQ352V	5962-1620827VYC
RT4G150L-CQ352PROTO	
RT4G150L-CQ352R	
RT4G150L-CQ352M	
RT4G150-FCG1657ES	
RT4G150-FCG1657PROTO	
RT4G150-FCG1657M	
RT4G150-1FCG1657ES	
RT4G150-1FCG1657PROTO	
RT4G150-1FCG1657M	
RT4G150L-FCG1657ES	
RT4G150L-FCG1657PROTO	
RT4G150L-FCG1657M	
RT4G150-FC1657ES	
RT4G150-FC1657PROTO	
RT4G150-FC1657M	
RT4G150-1FC1657ES	
RT4G150-1FC1657PROTO	
RT4G150-1FC1657M	

MCHP Part Number	DLA SMD Number
RT4G150L-FC1657ES	
RT4G150L-FC1657PROTO	
RT4G150L-FC1657M	
RT4G150-CB1657PROTO	
RT4G150-1CB1657PROTO	
RT4G150L-CB1657PROTO	

SmartFusion2 Part Numbers				
M2S005-1FG484	M2S010TS-FGG484I	M2S025-VF400I	M2S060-FCSG325	M2S090T-FCS325
M2S005-1FG484I	M2S010TS-VF256	M2S025-VFG256	M2S060-FCSG325I	M2S090T-FCS325I
M2S005-1FGG484	M2S010TS-VF256I	M2S025-VFG256I	M2S060-FG484	M2S090T-FCSG325
M2S005-1FGG484I	M2S010TS-VF400	M2S025-VFG400	M2S060-FG484I	M2S090T-FCSG325I
M2S005-1TQG144	M2S010TS-VF400I	M2S025-VFG400I	M2S060-FG676	M2S090T-FG484
M2S005-1TQG144I	M2S010TS-VFG256	M2S050-1FCS325	M2S060-FG676I	M2S090T-FG484I
M2S005-1VF256	M2S010TS-VFG256I	M2S050-1FCS325I	M2S060-FGG484	M2S090T-FG676
M2S005-1VF256I	M2S010TS-VFG400	M2S050-1FCSG325	M2S060-FGG484I	M2S090T-FG676I
M2S005-1VF400	M2S010TS-VFG400I	M2S050-1FCSG325I	M2S060-FGG676	M2S090T-FGG484
M2S005-1VF400I	M2S010T-VF256	M2S050-1FG484	M2S060-FGG676I	M2S090T-FGG484I
M2S005-1VFG256	M2S010T-VF256I	M2S050-1FG484I	M2S060T-1FCS325	M2S090T-FGG676
M2S005-1VFG256I	M2S010T-VF400	M2S050-1FG896	M2S060T-1FCS325I	M2S090T-FGG676I
M2S005-1VFG400	M2S010T-VF400I	M2S050-1FG896I	M2S060T-1FCSG325	M2S090TS-1FCS325
M2S005-1VFG400I	M2S010T-VFG256	M2S050-1FGG484	M2S060T-1FCSG325I	M2S090TS-1FCS325I
M2S005-FG484	M2S010T-VFG256I	M2S050-1FGG484I	M2S060T-1FG484	M2S090TS-1FCSG325
M2S005-FG484I	M2S010T-VFG400	M2S050-1FGG896	M2S060T-1FG484I	M2S090TS-1FCSG325I
M2S005-FGG484	M2S010T-VFG400I	M2S050-1FGG896I	M2S060T-1FG484M	M2S090TS-1FG484
M2S005-FGG484I	M2S010-VF256	M2S050-1VF400	M2S060T-1FG676	M2S090TS-1FG484I
M2S005S-1FG484	M2S010-VF256I	M2S050-1VF400I	M2S060T-1FG676I	M2S090TS-1FG484M
M2S005S-1FG484I	M2S010-VF400	M2S050-1VFG400	M2S060T-1FGG484	M2S090TS-1FG676
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M2S005S-1VF256	M2S025-1FCS325I	M2S050-FG484I	M2S060T-1VFG400	M2S090TS-1FGG676I
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M2S005S-1VFG256	M2S025-1FG484I	M2S050-FGG484I	M2S060T-FCSG325	M2S090TS-FCS325I
M2S005S-1VFG256I	M2S025-1FGG484	M2S050-FGG896	M2S060T-FCSG325I	M2S090TS-FCSG325
M2S005S-1VFG256T2	M2S025-1FGG484I	M2S050-FGG896I	M2S060T-FG484	M2S090TS-FCSG325I
M2S005S-1VFG400	M2S025-1VF256	M2S050T-1FCS325	M2S060T-FG484I	M2S090TS-FG484
M2S005S-1VFG400I	M2S025-1VF256I	M2S050T-1FCS325I	M2S060T-FG676	M2S090TS-FG484I

SmartFusion2 Part Numbers

M2S005S-1VFG400T2	M2S025-1VF400	M2S050T-1FCSG325	M2S060T-FG676I	M2S090TS-FG676
M2S005S-FG484	M2S025-1VF400I	M2S050T-1FCSG325I	M2S060T-FGG484	M2S090TS-FG676I
M2S005S-FG484I	M2S025-1VFG256	M2S050T-1FG484	M2S060T-FGG484I	M2S090TS-FGG484
M2S005S-FGG484	M2S025-1VFG256I	M2S050T-1FG484I	M2S060T-FGG676	M2S090TS-FGG484I
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M2S005S-TQG144	M2S025-1VFG400I	M2S050T-1FG896	M2S060TS-1FCS325	M2S090TS-FGG676I
M2S005S-TQG144I	M2S025-FCS325	M2S050T-1FG896I	M2S060TS-1FCS325I	M2S150-1FC1152
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M2S005S-VF400I	M2S025-FG484	M2S050T-1FGG896	M2S060TS-1FG484I	M2S150-1FCS536
M2S005S-VFG256	M2S025-FG484I	M2S050T-1FGG896I	M2S060TS-1FG484M	M2S150-1FCS536I
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M2S005S-VFG400	M2S025-FGG484I	M2S050T-1VF400I	M2S060TS-1FG676I	M2S150-1FCSG536I
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M2S005-TQG144	M2S025T-1FCS325I	M2S050T-1VFG400I	M2S060TS-1FGG484I	M2S150-1FCV484I
M2S005-TQG144I	M2S025T-1FCSG325	M2S050T-FCS325	M2S060TS-1FGG484M	M2S150-1FCVG484
M2S005-VF256	M2S025T-1FCSG325I	M2S050T-FCS325I	M2S060TS-1FGG484T2	M2S150-1FCVG484I
M2S005-VF256I	M2S025T-1FG484	M2S050T-FCSG325	M2S060TS-1FGG676	M2S150-ADV-DEV-KIT
M2S005-VF400	M2S025T-1FG484I	M2S050T-FCSG325I	M2S060TS-1FGG676I	M2S150-FC1152
M2S005-VF400I	M2S025T-1FG484M	M2S050T-FG484	M2S060TS-1FGG676T2	M2S150-FC1152I
M2S005-VFG256	M2S025T-1FGG484	M2S050T-FG484I	M2S060TS-1VF400	M2S150-FCG1152
M2S005-VFG256I	M2S025T-1FGG484I	M2S050T-FG896	M2S060TS-1VF400I	M2S150-FCG1152I
M2S005-VFG400	M2S025T-1FGG484M	M2S050T-FG896I	M2S060TS-1VFG400	M2S150-FCS536
M2S005-VFG400I	M2S025T-1VF256	M2S050T-FGG484	M2S060TS-1VFG400I	M2S150-FCS536I
M2S010-1FG484	M2S025T-1VF256I	M2S050T-FGG484I	M2S060TS-1VFG400T2	M2S150-FCSG536
M2S010-1FG484I	M2S025T-1VF400	M2S050T-FGG896	M2S060TS-FCS325	M2S150-FCSG536I
M2S010-1FGG484	M2S025T-1VF400I	M2S050T-FGG896I	M2S060TS-FCS325I	M2S150-FCV484
M2S010-1FGG484I	M2S025T-1VFG256	M2S050TS-1FCS325	M2S060TS-FCSG325	M2S150-FCV484I
M2S010-1TQG144	M2S025T-1VFG256I	M2S050TS-1FCS325I	M2S060TS-FCSG325I	M2S150-FCVG484
M2S010-1TQG144I	M2S025T-1VFG400	M2S050TS-1FCSG325	M2S060TS-FG484	M2S150-FCVG484I
M2S010-1VF256	M2S025T-1VFG400I	M2S050TS-1FCSG325I	M2S060TS-FG484I	M2S150T-1FC1152
M2S010-1VF256I	M2S025T-FCS325	M2S050TS-1FG484	M2S060TS-FG676	M2S150T-1FC1152I
M2S010-1VF400	M2S025T-FCS325I	M2S050TS-1FG484I	M2S060TS-FG676I	M2S150T-1FC1152M
M2S010-1VF400I	M2S025T-FCSG325	M2S050TS-1FG484M	M2S060TS-FGG484	M2S150T-1FCG1152
M2S010-1VFG256	M2S025T-FCSG325I	M2S050TS-1FG896	M2S060TS-FGG484I	M2S150T-1FCG1152I
M2S010-1VFG256I	M2S025T-FG484	M2S050TS-1FG896I	M2S060TS-FGG676	M2S150T-1FCG1152M
M2S010-1VFG400	M2S025T-FG484I	M2S050TS-1FGG484	M2S060TS-FGG676I	M2S150T-1FCS536
M2S010-1VFG400I	M2S025T-FGG484	M2S050TS-1FGG484I	M2S060TS-VF400	M2S150T-1FCS536I
M2S010-FG484	M2S025T-FGG484I	M2S050TS-1FGG484M	M2S060TS-VF400I	M2S150T-1FCSG536
M2S010-FG484I	M2S025TS-1FCS325	M2S050TS-1FGG896	M2S060TS-VFG400	M2S150T-1FCSG536I
M2S010-FGG484	M2S025TS-1FCS325I	M2S050TS-1FGG896I	M2S060TS-VFG400I	M2S150T-1FCV484
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M2S010S-1TQG144	M2S025TS-1FCSG325I	M2S050TS-1VF400I	M2S060T-VF400I	M2S150T-1FCV484M
M2S010S-1TQG144I	M2S025TS-1FG484	M2S050TS-1VFG400	M2S060T-VFG400	M2S150T-1FCVG484
M2S010S-1TQG144T2	M2S025TS-1FG484I	M2S050TS-1VFG400I	M2S060T-VFG400I	M2S150T-1FCVG484I
M2S010S-TQG144	M2S025TS-1FG484M	M2S050TS-FCS325	M2S060-VF400	M2S150T-FC1152
M2S010S-TQG144I	M2S025TS-1FGG484	M2S050TS-FCS325I	M2S060-VF400I	M2S150T-FC1152I
M2S010T-1FG484	M2S025TS-1FGG484I	M2S050TS-FCSG325	M2S060-VFG400	M2S150T-FCG1152

SmartFusion2 Part Numbers

M2S010T-1FG484I	M2S025TS-1FGG484M	M2S050TS-FCSG325I	M2S060-VFG400I	M2S150T-FCG1152I
M2S010T-1FG484M	M2S025TS-1FGG484T2	M2S050TS-FG484	M2S090-1FCS325	M2S150T-FCS536
M2S010T-1FGG484	M2S025TS-1VF256	M2S050TS-FG484I	M2S090-1FCS325I	M2S150T-FCS536I
M2S010T-1FGG484I	M2S025TS-1VF256I	M2S050TS-FG896	M2S090-1FCSG325	M2S150T-FCSG536
M2S010T-1FGG484M	M2S025TS-1VF400	M2S050TS-FG896I	M2S090-1FCSG325I	M2S150T-FCSG536I
M2S010T-1VF256	M2S025TS-1VF400I	M2S050TS-FGG484	M2S090-1FG484	M2S150T-FCV484
M2S010T-1VF256I	M2S025TS-1VFG256	M2S050TS-FGG484I	M2S090-1FG484I	M2S150T-FCV484I
M2S010T-1VF400	M2S025TS-1VFG256I	M2S050TS-FGG896	M2S090-1FG676	M2S150T-FCVG484
M2S010T-1VF400I	M2S025TS-1VFG256T2	M2S050TS-FGG896I	M2S090-1FG676I	M2S150T-FCVG484I
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M2S010T-1VFG400	M2S025TS-1VFG400T2	M2S050TS-VFG400	M2S090-1FGG676	M2S150TS-1FC1152M
M2S010T-1VFG400I	M2S025TS-FCS325	M2S050TS-VFG400I	M2S090-1FGG676I	M2S150TS-1FCG1152
M2S010T-FG484	M2S025TS-FCS325I	M2S050T-VF400	M2S090-FCS325	M2S150TS-1FCG1152I
M2S010T-FG484I	M2S025TS-FCSG325	M2S050T-VF400I	M2S090-FCS325I	M2S150TS-1FCG1152M
M2S010T-FGG484	M2S025TS-FCSG325I	M2S050T-VFG400	M2S090-FCSG325	M2S150TS-1FCS536
M2S010T-FGG484I	M2S025TS-FG484	M2S050T-VFG400I	M2S090-FCSG325I	M2S150TS-1FCS536I
M2S010-TQG144	M2S025TS-FG484I	M2S050-VF400	M2S090-FG484	M2S150TS-1FCSG536
M2S010-TQG144I	M2S025TS-FGG484	M2S050-VF400I	M2S090-FG484I	M2S150TS-1FCSG536I
M2S010TS-1FG484	M2S025TS-FGG484I	M2S050-VFG400	M2S090-FG676	M2S150TS-1FCV484
M2S010TS-1FG484I	M2S025TS-VF256	M2S050-VFG400I	M2S090-FG676I	M2S150TS-1FCV484I
M2S010TS-1FG484M	M2S025TS-VF256I	M2S060-1FCS325	M2S090-FGG484	M2S150TS-1FCV484M
M2S010TS-1FGG484	M2S025TS-VF400	M2S060-1FCS325I	M2S090-FGG484I	M2S150TS-1FCVG484
M2S010TS-1FGG484I	M2S025TS-VF400I	M2S060-1FCSG325	M2S090-FGG676	M2S150TS-1FCVG484I
M2S010TS-1FGG484M	M2S025TS-VFG256	M2S060-1FCSG325I	M2S090-FGG676I	M2S150TS-FC1152
M2S010TS-1FGG484T2	M2S025TS-VFG256I	M2S060-1FG484	M2S090T-1FCS325	M2S150TS-FC1152I
M2S010TS-1VF256	M2S025TS-VFG400	M2S060-1FG484I	M2S090T-1FCS325I	M2S150TS-FCG1152
M2S010TS-1VF256I	M2S025TS-VFG400I	M2S060-1FG676	M2S090T-1FCSG325	M2S150TS-FCG1152I
M2S010TS-1VF400	M2S025T-VF256	M2S060-1FG676I	M2S090T-1FCSG325I	M2S150TS-FCS536
M2S010TS-1VF400I	M2S025T-VF256I	M2S060-1FGG484	M2S090T-1FG484	M2S150TS-FCS536I
M2S010TS-1VFG256	M2S025T-VF400	M2S060-1FGG484I	M2S090T-1FG484I	M2S150TS-FCSG536
M2S010TS-1VFG256I	M2S025T-VF400I	M2S060-1FGG676	M2S090T-1FG484M	M2S150TS-FCSG536I
M2S010TS-1VFG256T2	M2S025T-VFG256	M2S060-1FGG676I	M2S090T-1FG676	M2S150TS-FCV484
M2S010TS-1VFG400	M2S025T-VFG256I	M2S060-1VF400	M2S090T-1FG676I	M2S150TS-FCV484I
M2S010TS-1VFG400I	M2S025T-VFG400	M2S060-1VF400I	M2S090T-1FGG484	M2S150TS-FCVG484
M2S010TS-1VFG400T2	M2S025T-VFG400I	M2S060-1VFG400	M2S090T-1FGG484I	M2S150TS-FCVG484I
M2S010TS-FG484	M2S025-VF256	M2S060-1VFG400I	M2S090T-1FGG484M	
M2S010TS-FG484I	M2S025-VF256I	M2S060-FCS325	M2S090T-1FGG676	
M2S010TS-FGG484	M2S025-VF400	M2S060-FCS325I	M2S090T-1FGG676I	

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M2GL005-1FG484	M2GL010TS-FG484I	M2GL025-VF256	M2GL060-1VFG400	M2GL090T-1FGG484
M2GL005-1FG484I	M2GL010TS-FGG484	M2GL025-VF256I	M2GL060-1VFG400I	M2GL090T-1FGG484I
M2GL005-1FGG484	M2GL010TS-FGG484I	M2GL025-VF400	M2GL060-FCS325	M2GL090T-1FGG484M
M2GL005-1FGG484I	M2GL010TS-VF256	M2GL025-VF400I	M2GL060-FCS325I	M2GL090T-1FGG676
M2GL005-1FGG484T1	M2GL010TS-VF256I	M2GL025-VFG256	M2GL060-FCSG325	M2GL090T-1FGG676I
M2GL005-1TQG144	M2GL010TS-VF400	M2GL025-VFG256I	M2GL060-FCSG325I	M2GL090T-FCS325

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M2GL005-1TQG144I	M2GL010TS-VF400I	M2GL025-VFG400	M2GL060-FG484	M2GL090T-FCS325I
M2GL005-1VF256	M2GL010TS-VFG256	M2GL025-VFG400I	M2GL060-FG484I	M2GL090T-FCSG325
M2GL005-1VF256I	M2GL010TS-VFG256I	M2GL050-1FCS325	M2GL060-FG676	M2GL090T-FCSG325I
M2GL005-1VF400	M2GL010TS-VFG400	M2GL050-1FCS325I	M2GL060-FG676I	M2GL090T-FG484
M2GL005-1VF400I	M2GL010TS-VFG400I	M2GL050-1FCSG325	M2GL060-FGG484	M2GL090T-FG484I
M2GL005-1VFG256	M2GL010T-VF256	M2GL050-1FCSG325I	M2GL060-FGG484I	M2GL090T-FG676
M2GL005-1VFG256I	M2GL010T-VF256I	M2GL050-1FG484	M2GL060-FGG676	M2GL090T-FG676I
M2GL005-1VFG400	M2GL010T-VF400	M2GL050-1FG484I	M2GL060-FGG676I	M2GL090T-FGG484
M2GL005-1VFG400I	M2GL010T-VF400I	M2GL050-1FG896	M2GL060T-1FCS325	M2GL090T-FGG484I
M2GL005-FG484	M2GL010T-VFG256	M2GL050-1FG896I	M2GL060T-1FCS325I	M2GL090T-FGG676
M2GL005-FG484I	M2GL010T-VFG256I	M2GL050-1FGG484	M2GL060T-1FCSG325	M2GL090T-FGG676I
M2GL005-FGG484	M2GL010T-VFG400	M2GL050-1FGG484I	M2GL060T-1FCSG325I	M2GL090TS-1FCS325
M2GL005-FGG484I	M2GL010T-VFG400I	M2GL050-1FGG896	M2GL060T-1FG484	M2GL090TS-1FCS325I
M2GL005S-1FG484	M2GL010-VF256	M2GL050-1FGG896I	M2GL060T-1FG484I	M2GL090TS-1FCSG325
M2GL005S-1FG484I	M2GL010-VF256I	M2GL050-1VF400	M2GL060T-1FG484M	M2GL090TS-1FCSG325I
M2GL005S-1FGG484	M2GL010-VF400	M2GL050-1VF400I	M2GL060T-1FG676	M2GL090TS-1FG484
M2GL005S-1FGG484I	M2GL010-VF400I	M2GL050-1VFG400	M2GL060T-1FG676I	M2GL090TS-1FG484I
M2GL005S-1FGG484T2	M2GL010-VFG256	M2GL050-1VFG400I	M2GL060T-1FGG484	M2GL090TS-1FG484M
M2GL005S-1TQG144	M2GL010-VFG256I	M2GL050-FCS325	M2GL060T-1FGG484I	M2GL090TS-1FG676
M2GL005S-1TQG144I	M2GL010-VFG400	M2GL050-FCS325I	M2GL060T-1FGG484M	M2GL090TS-1FG676I
M2GL005S-1TQG144T2	M2GL010-VFG400I	M2GL050-FCSG325	M2GL060T-1FGG676	M2GL090TS-1FGG484
M2GL005S-1VF256	M2GL025-1FCS325	M2GL050-FCSG325I	M2GL060T-1FGG676I	M2GL090TS-1FGG484I
M2GL005S-1VF256I	M2GL025-1FCS325I	M2GL050-FG484	M2GL060T-1VF400	M2GL090TS-1FGG484M
M2GL005S-1VF400	M2GL025-1FCSG325	M2GL050-FG484I	M2GL060T-1VF400I	M2GL090TS-1FGG484T2
M2GL005S-1VF400I	M2GL025-1FCSG325I	M2GL050-FG896	M2GL060T-1VFG400	M2GL090TS-1FGG676
M2GL005S-1VFG256	M2GL025-1FG484	M2GL050-FG896I	M2GL060T-1VFG400I	M2GL090TS-1FGG676I
M2GL005S-1VFG256I	M2GL025-1FG484I	M2GL050-FGG484	M2GL060T-FCS325	M2GL090TS-1FGG676T2
M2GL005S-1VFG256T2	M2GL025-1FGG484	M2GL050-FGG484I	M2GL060T-FCS325I	M2GL090TS-FCS325
M2GL005S-1VFG400	M2GL025-1FGG484I	M2GL050-FGG896	M2GL060T-FCSG325	M2GL090TS-FCS325I
M2GL005S-1VFG400I	M2GL025-1FGG484T1	M2GL050-FGG896I	M2GL060T-FCSG325I	M2GL090TS-FCSG325
M2GL005S-1VFG400T2	M2GL025-1VF256	M2GL050T-1FCS325	M2GL060T-FG484	M2GL090TS-FCSG325I
M2GL005S-FG484	M2GL025-1VF256I	M2GL050T-1FCS325I	M2GL060T-FG484I	M2GL090TS-FG484
M2GL005S-FG484I	M2GL025-1VF400	M2GL050T-1FCSG325	M2GL060T-FG676	M2GL090TS-FG484I
M2GL005S-FGG484	M2GL025-1VF400I	M2GL050T-1FCSG325I	M2GL060T-FG676I	M2GL090TS-FG676
M2GL005S-FGG484I	M2GL025-1VFG256	M2GL050T-1FG484	M2GL060T-FGG484	M2GL090TS-FG676I
M2GL005S-TQG144	M2GL025-1VFG256I	M2GL050T-1FG484I	M2GL060T-FGG484I	M2GL090TS-FGG484
M2GL005S-TQG144I	M2GL025-1VFG400	M2GL050T-1FG484M	M2GL060T-FGG676	M2GL090TS-FGG484I
M2GL005S-VF256	M2GL025-1VFG400I	M2GL050T-1FG896	M2GL060T-FGG676I	M2GL090TS-FGG676
M2GL005S-VF256I	M2GL025-FCS325	M2GL050T-1FG896I	M2GL060TS-1FCS325	M2GL090TS-FGG676I
M2GL005S-VF400	M2GL025-FCS325I	M2GL050T-1FGG484	M2GL060TS-1FCS325I	M2GL150-1FC1152
M2GL005S-VF400I	M2GL025-FCSG325	M2GL050T-1FGG484I	M2GL060TS-1FCSG325	M2GL150-1FC1152I
M2GL005S-VFG256	M2GL025-FCSG325I	M2GL050T-1FGG484M	M2GL060TS-1FCSG325I	M2GL150-1FCG1152
M2GL005S-VFG256I	M2GL025-FG484	M2GL050T-1FGG896	M2GL060TS-1FG484	M2GL150-1FCG1152I
M2GL005S-VFG400	M2GL025-FG484I	M2GL050T-1FGG896I	M2GL060TS-1FG484I	M2GL150-1FCS536
M2GL005S-VFG400I	M2GL025-FGG484	M2GL050T-1VF400	M2GL060TS-1FG484M	M2GL150-1FCS536I
M2GL005-TQG144	M2GL025-FGG484I	M2GL050T-1VF400I	M2GL060TS-1FG676	M2GL150-1FCSG536
M2GL005-TQG144I	M2GL025T-1FCS325	M2GL050T-1VFG400	M2GL060TS-1FG676I	M2GL150-1FCSG536I
M2GL005-VF256	M2GL025T-1FCS325I	M2GL050T-1VFG400I	M2GL060TS-1FGG484	M2GL150-1FCV484
M2GL005-VF256I	M2GL025T-1FCSG325	M2GL050T-FCS325	M2GL060TS-1FGG484I	M2GL150-1FCV484I

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M2GL005-VF400	M2GL025T-1FCSG325I	M2GL050T-FCS325I	M2GL060TS-1FGG484M	M2GL150-1FCVG484
M2GL005-VF400I	M2GL025T-1FG484	M2GL050T-FCSG325	M2GL060TS-1FGG484T2	M2GL150-1FCVG484I
M2GL005-VFG256	M2GL025T-1FG484I	M2GL050T-FCSG325I	M2GL060TS-1FGG676	M2GL150-FC1152
M2GL005-VFG256I	M2GL025T-1FG484M	M2GL050T-FG484	M2GL060TS-1FGG676I	M2GL150-FC1152I
M2GL005-VFG400	M2GL025T-1FGG484	M2GL050T-FG484I	M2GL060TS-1FGG676T2	M2GL150-FCG1152
M2GL005-VFG400I	M2GL025T-1FGG484I	M2GL050T-FG896	M2GL060TS-1VF400	M2GL150-FCG1152I
M2GL010-1FG484	M2GL025T-1FGG484M	M2GL050T-FG896I	M2GL060TS-1VF400I	M2GL150-FCS536
M2GL010-1FG484I	M2GL025T-1VF256	M2GL050T-FGG484	M2GL060TS-1VFG400	M2GL150-FCS536I
M2GL010-1FGG484	M2GL025T-1VF256I	M2GL050T-FGG484I	M2GL060TS-1VFG400I	M2GL150-FCSG536
M2GL010-1FGG484I	M2GL025T-1VF400	M2GL050T-FGG896	M2GL060TS-1VFG400T2	M2GL150-FCSG536I
M2GL010-1FGG484T1	M2GL025T-1VF400I	M2GL050T-FGG896I	M2GL060TS-FCS325	M2GL150-FCV484
M2GL010-1TQG144	M2GL025T-1VFG256	M2GL050TS-1FCS325	M2GL060TS-FCS325I	M2GL150-FCV484I
M2GL010-1TQG144I	M2GL025T-1VFG256I	M2GL050TS-1FCS325I	M2GL060TS-FCSG325	M2GL150-FCVG484
M2GL010-1VF256	M2GL025T-1VFG400	M2GL050TS-1FCSG325	M2GL060TS-FCSG325I	M2GL150-FCVG484I
M2GL010-1VF256I	M2GL025T-1VFG400I	M2GL050TS-1FCSG325I	M2GL060TS-FG484	M2GL150T-1FC1152
M2GL010-1VF400	M2GL025T-FCS325	M2GL050TS-1FG484	M2GL060TS-FG484I	M2GL150T-1FC1152I
M2GL010-1VF400I	M2GL025T-FCS325I	M2GL050TS-1FG484I	M2GL060TS-FG676	M2GL150T-1FC1152M
M2GL010-1VFG256	M2GL025T-FCSG325	M2GL050TS-1FG484M	M2GL060TS-FG676I	M2GL150T-1FCG1152
M2GL010-1VFG256I	M2GL025T-FCSG325I	M2GL050TS-1FG896	M2GL060TS-FGG484	M2GL150T-1FCG1152I
M2GL010-1VFG400	M2GL025T-FG484	M2GL050TS-1FG896I	M2GL060TS-FGG484I	M2GL150T-1FCG1152M
M2GL010-1VFG400I	M2GL025T-FG484I	M2GL050TS-1FGG484	M2GL060TS-FGG676	M2GL150T-1FCS536
M2GL010-FG484	M2GL025T-FGG484	M2GL050TS-1FGG484I	M2GL060TS-FGG676I	M2GL150T-1FCS536I
M2GL010-FG484I	M2GL025T-FGG484I	M2GL050TS-1FGG484M	M2GL060TS-VF400	M2GL150T-1FCSG536
M2GL010-FGG484	M2GL025TS-1FCS325	M2GL050TS-1FGG896	M2GL060TS-VF400I	M2GL150T-1FCSG536I
M2GL010-FGG484I	M2GL025TS-1FCS325I	M2GL050TS-1FGG896I	M2GL060TS-VFG400	M2GL150T-1FCV484
M2GL010S-1TQG144	M2GL025TS-1FCSG325	M2GL050TS-1VF400	M2GL060TS-VFG400I	M2GL150T-1FCV484I
M2GL010S-1TQG144I	M2GL025TS-1FCSG325I	M2GL050TS-1VF400I	M2GL060T-VF400	M2GL150T-1FCV484M
M2GL010S-1TQG144T2	M2GL025TS-1FG484	M2GL050TS-1VFG400	M2GL060T-VF400I	M2GL150T-1FCVG484
M2GL010S-TQG144	M2GL025TS-1FG484I	M2GL050TS-1VFG400I	M2GL060T-VFG400	M2GL150T-1FCVG484I
M2GL010S-TQG144I	M2GL025TS-1FG484M	M2GL050TS-FCS325	M2GL060T-VFG400I	M2GL150T-FC1152
M2GL010T-1FG484	M2GL025TS-1FGG484	M2GL050TS-FCS325I	M2GL060-VF400	M2GL150T-FC1152I
M2GL010T-1FG484I	M2GL025TS-1FGG484I	M2GL050TS-FCSG325	M2GL060-VF400I	M2GL150T-FCG1152
M2GL010T-1FG484M	M2GL025TS-1FGG484M	M2GL050TS-FCSG325I	M2GL060-VFG400	M2GL150T-FCG1152I
M2GL010T-1FGG484	M2GL025TS-1FGG484T2	M2GL050TS-FG484	M2GL060-VFG400I	M2GL150T-FCS536
M2GL010T-1FGG484I	M2GL025TS-1VF256	M2GL050TS-FG484I	M2GL090-1FCS325	M2GL150T-FCS536I
M2GL010T-1FGG484M	M2GL025TS-1VF256I	M2GL050TS-FG896	M2GL090-1FCS325I	M2GL150T-FCSG536
M2GL010T-1VF256	M2GL025TS-1VF400	M2GL050TS-FG896I	M2GL090-1FCSG325	M2GL150T-FCSG536I
M2GL010T-1VF256I	M2GL025TS-1VF400I	M2GL050TS-FGG484	M2GL090-1FCSG325I	M2GL150T-FCV484
M2GL010T-1VF400	M2GL025TS-1VFG256	M2GL050TS-FGG484I	M2GL090-1FG484	M2GL150T-FCV484I
M2GL010T-1VF400I	M2GL025TS-1VFG256I	M2GL050TS-FGG896	M2GL090-1FG484I	M2GL150T-FCVG484
M2GL010T-1VFG256	M2GL025TS-1VFG256T2	M2GL050TS-FGG896I	M2GL090-1FG676	M2GL150T-FCVG484I
M2GL010T-1VFG256I	M2GL025TS-1VFG400	M2GL050TS-VF400	M2GL090-1FG676I	M2GL150TS-1FC1152
M2GL010T-1VFG400	M2GL025TS-1VFG400I	M2GL050TS-VF400I	M2GL090-1FGG484	M2GL150TS-1FC1152I
M2GL010T-1VFG400I	M2GL025TS-1VFG400T2	M2GL050TS-VFG400	M2GL090-1FGG484I	M2GL150TS-1FC1152M
M2GL010T-FG484	M2GL025TS-FCS325	M2GL050TS-VFG400I	M2GL090-1FGG484T1	M2GL150TS-1FCG1152
M2GL010T-FG484I	M2GL025TS-FCS325I	M2GL050T-VF400	M2GL090-1FGG676	M2GL150TS-1FCG1152I
M2GL010T-FGG484	M2GL025TS-FCSG325	M2GL050T-VF400I	M2GL090-1FGG676I	M2GL150TS-1FCG1152M
M2GL010T-FGG484I	M2GL025TS-FCSG325I	M2GL050T-VFG400	M2GL090-FCS325	M2GL150TS-1FCS536
M2GL010-TQG144	M2GL025TS-FG484	M2GL050T-VFG400I	M2GL090-FCS325I	

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M2GL010-TQG144I	M2GL025TS-FG484I	M2GL050-VF400	M2GL090-FCSG325	M2GL150TS-1FCS536I
M2GL010TS-1FG484	M2GL025TS-FGG484	M2GL050-VF400I	M2GL090-FCSG325I	M2GL150TS-1FCSG536
M2GL010TS-1FG484I	M2GL025TS-FGG484I	M2GL050-VFG400	M2GL090-FG484	M2GL150TS-1FCSG536I
M2GL010TS-1FG484M	M2GL025TS-VF256	M2GL050-VFG400I	M2GL090-FG484I	M2GL150TS-1FCV484
M2GL010TS-1FGG484	M2GL025TS-VF256I	M2GL060-1FCS325	M2GL090-FG676	M2GL150TS-1FCV484I
M2GL010TS-1FGG484I	M2GL025TS-VF400	M2GL060-1FCS325I	M2GL090-FG676I	M2GL150TS-1FCV484M
M2GL010TS-1FGG484M	M2GL025TS-VF400I	M2GL060-1FCSG325	M2GL090-FGG484	M2GL150TS-1FCVG484
M2GL010TS-1FGG484T2	M2GL025TS-VFG256	M2GL060-1FCSG325I	M2GL090-FGG484I	M2GL150TS-1FCVG484I
M2GL010TS-1VF256	M2GL025TS-VFG256I	M2GL060-1FG484	M2GL090-FGG676	
M2GL010TS-1VF256I	M2GL025TS-VFG400	M2GL060-1FG484I	M2GL090-FGG676I	M2GL150TS-FC1152
M2GL010TS-1VF400	M2GL025TS-VFG400I	M2GL060-1FG676	M2GL090T-1FCS325	M2GL150TS-FC1152I
M2GL010TS-1VF400I	M2GL025T-VF256	M2GL060-1FG676I	M2GL090T-1FCS325I	M2GL150TS-FCG1152
M2GL010TS-1VFG256	M2GL025T-VF256I	M2GL060-1FGG484	M2GL090T-1FCSG325	M2GL150TS-FCG1152I
M2GL010TS-1VFG256I	M2GL025T-VF400	M2GL060-1FGG484I	M2GL090T-1FCSG325I	M2GL150TS-FCS536
M2GL010TS-1VFG256T2	M2GL025T-VF400I	M2GL060-1FGG484T1	M2GL090T-1FG484	M2GL150TS-FCS536I
M2GL010TS-1VFG400	M2GL025T-VFG256	M2GL060-1FGG676	M2GL090T-1FG484I	M2GL150TS-FCSG536
M2GL010TS-1VFG400I	M2GL025T-VFG256I	M2GL060-1FGG676I	M2GL090T-1FG484M	M2GL150TS-FCSG536I
M2GL010TS-1VFG400T2	M2GL025T-VFG400	M2GL060-1VF400	M2GL090T-1FG676	M2GL150TS-FCV484
M2GL010TS-FG484	M2GL025T-VFG400I	M2GL060-1VF400I	M2GL090T-1FG676I	M2GL150TS-FCV484I
				M2GL150TS-FCVG484
				M2GL150TS-FCVG484I

PolarFire Part Numbers				
MPF100T-1FCG484E	MPF100TS-FCVG484I	MPF200TL-FCG784I	MPF300T-1FCVG484E	MPF300TS-1FCG784I
MPF100T-1FCG484I	MPF200T-1FCG484E	MPF200TL-FCSG325E	MPF300T-1FCVG484I	MPF300TS-1FCSG536I
MPF100T-1FCG484T2	MPF200T-1FCG484I	MPF200TL-FCSG325I	MPF300T-1FCVG484T2	MPF300TS-1FCVG484I
MPF100T-1FCSG325E	MPF200T-1FCG484T2	MPF200TL-FCSG536E	MPF300T-FCG1152E	MPF300TS-FC484M
MPF100T-1FCSG325I	MPF200T-1FCG784E	MPF200TL-FCSG536I	MPF300T-FCG1152I	MPF300TS-FCG1152I
MPF100T-1FCSG325T2	MPF200T-1FCG784I	MPF200TL-FCVG484E	MPF300T-FCG484E	MPF300TS-FCG484I
MPF100T-1FCVG484E	MPF200T-1FCSG325E	MPF200TL-FCVG484I	MPF300T-FCG484I	MPF300TS-FCG784I
MPF100T-1FCVG484I	MPF200T-1FCSG325I	MPF200TL-FCG484I	MPF300T-FCG784E	MPF300TS-FCS536M
MPF100T-1FCVG484T2	MPF200T-1FCSG325T2	MPF200TL-FCG784I	MPF300T-FCG784I	MPF300TS-FCSG536I
MPF100T-FCG484E	MPF200T-1FCSG536E	MPF200TL-FCSG325I	MPF300T-FCSG536E	MPF300TS-FCV484M
MPF100T-FCG484I	MPF200T-1FCSG536I	MPF200TL-FCSG536I	MPF300T-FCSG536I	MPF300TS-FCVG484I
MPF100T-FCG484T2	MPF200T-1FCSG536T2	MPF200TL-FCVG484I	MPF300T-FCSG536T2	MPF500T-1FCG1152E
MPF100T-FCSG325E	MPF200T-1FCVG484E	MPF200TS-1FCG484I	MPF300T-FCVG484E	MPF500T-1FCG1152I
MPF100T-FCSG325I	MPF200T-1FCVG484I	MPF200TS-1FCG784I	MPF300T-FCVG484I	MPF500T-1FCG784E
MPF100T-FCSG325T2	MPF200T-1FCVG484T2	MPF200TS-1FCSG325I	MPF300T-FCVG484T2	MPF500T-1FCG784I
MPF100T-FCVG484E	MPF200T-FCG484E	MPF200TS-1FCSG536I	MPF300TL-FCG1152E	MPF500T-FCG1152E
MPF100T-FCVG484I	MPF200T-FCG484I	MPF200TS-1FCVG484I	MPF300TL-FCG1152I	MPF500T-FCG1152I
MPF100T-FCVG484T2	MPF200T-FCG484T2	MPF200TS-FCG484I	MPF300TL-FCG484E	MPF500T-FCG784E
MPF100TL-FCG484E	MPF200T-FCG784E	MPF200TS-FCG784I	MPF300TL-FCG484I	MPF500T-FCG784I
MPF100TL-FCG484I	MPF200T-FCG784I	MPF200TS-FCS325M	MPF300TL-FCG784E	MPF500TL-FCG1152E
MPF100TL-FCSG325E	MPF200T-FCSG325E	MPF200TS-FCSG325I	MPF300TL-FCG784I	MPF500TL-FCG1152I
MPF100TL-FCSG325I	MPF200T-FCSG325I	MPF200TS-FCSG536I	MPF300TL-FCSG536E	MPF500TL-FCG784E
MPF100TL-FCVG484E	MPF200T-FCSG325T2	MPF200TS-FCVG484I	MPF300TL-FCSG536I	MPF500TL-FCG784I
MPF100TL-FCVG484I	MPF200T-FCSG536E	MPF300T-1FCG1152E	MPF300TL-FCVG484E	MPF500TL-FCG1152I
MPF100TL-FCG484I	MPF200T-FCSG536I	MPF300T-1FCG1152I	MPF300TL-FCVG484I	MPF500TL-FCG784I

PolarFire Part Numbers				
MPF100TLS-FCSG325I	MPF200T-FCSG536T2	MPF300T-1FCG484E	MPF300TLS-FCG1152I	MPF500TS-1FCG1152I
MPF100TLS-FCVG484I	MPF200T-FCVG484E	MPF300T-1FCG484I	MPF300TLS-FCG484I	MPF500TS-1FCG784I
MPF100TS-1FCG484I	MPF200T-FCVG484I	MPF300T-1FCG784E	MPF300TLS-FCG784I	MPF500TS-FC1152M
MPF100TS-1FCSG325I	MPF200T-FCVG484T2	MPF300T-1FCG784I	MPF300TLS-FCSG536I	MPF500TS-FC784M
MPF100TS-1FCVG484I	MPF200TL-FCG484E	MPF300T-1FCSG536E	MPF300TLS-FCVG484I	MPF500TS-FCG1152I
MPF100TS-FCG484I	MPF200TL-FCG484I	MPF300T-1FCSG536I	MPF300TS-1FCG1152I	MPF500TS-FCG784I
MPF100TS-FCSG325I	MPF200TL-FCG784E	MPF300T-1FCSG536T2	MPF300TS-1FCG484I	MPF300XT-1FCG484I

Regards,

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