

Microsemi Corporation

November 10, 2017

Product/Process Change Notification No: PCN17027A

Change Classification: Major

Subject: SmartFusion2 and IGLOO2 Changes (Addendum A)

Summary

This document describes one Product Change Notification (PCN) and three Customer Advisory Notices (CAN) for all SmartFusion2 and IGLOO2 devices. A summary and the action required by the customer can be found in the table below.

Addendum A includes a description of change clarification for CAN 17027.3.

Notification	Description	Action required
PCN 17027.1	Timing data updates for certain customer I/O	Re-run the timer.
CAN 17027.2	New recommendations on using LVDS25 and LVDS33 with a low Vid	Analyze your design for the additional delay at low Vid levels.
CAN 17027.3	I/O driven high momentarily at start of programming a blank device	Re-run the bitstream generation tool from Libero v11.8 SP1.
CAN 17027.4	Digital certificates have the wrong product information	None.

PCN 17027.1

Description of Change: Timing data adjustments for a subset of fabric to custom block interconnect for all SmartFusion2 and IGLOO2 devices

For SmartFusion2 and IGLOO2 devices, interconnect timing data has been updated to more accurately reflect silicon measurements between the fabric and the surrounding blocks. These fabric-to-custom block interconnects have variable metal lengths depending on I/O location that were not accounted for in the previous model. The tables listed below contain the worst-case additional timing for each device and temperature grade (STD speed grade device delays are 17.65% slower). Interfaces affected are:

- I/Os to CCC, GB
- CCC to GB
- Fabric to CCC, MSS, PCIE, FDDR
- Fabric to I/O and I/O to Fabric
- IOINFF
- IO Tap Delays

Application Impact

- Clock insertion delays and propagation delays between I/Os and FFs depending on the I/O location
- Clock-to-out and external setup and hold timing is impacted
- The additional timing delay described in the tables below is important for source synchronous applications where I/O delay taps are used to align data and clock
- The impact on register-to-register clock frequencies is less than 1%

Delays by Device

Additional delay in picoseconds, -1 speed grade, C temp 85 °C TJ							
Category	M2S005	M2S010	M2S025	M2S050	M2S060	M2S090	M2S150
CCC to GB	-42	-27	141	209	208	301	293
I/Os to CCC	36	57	137	295	264	555	138
I/Os to GB	110	71	497	886	1501	1234	158
Fabric to CCC	202	202	202	150	183	157	157
Fabric to MSS	824	183	193	194	181	276	181
Fabric to PCIE	n/a	141	292	198	263	200	199
Fabric to FDDR	n/a	n/a	n/a	294	n/a	n/a	167
Fabric to I/Os	402	393	988	481	950	913	606
I/Os to Fabric	145	284	417	510	351	331	641
IOINFF (Bypass)	128	102	126	82	85	168	74
IOINFF (Hold)	32	47	45	47	46	46	46
IOINFF (Setup)	100	73	130	52	54	143	44

Additional delay in picoseconds, -1 speed grade, I temp 100 °C Tj

Category	M2S005	M2S010	M2S025	M2S050	M2S060	M2S090	M2S150
CCC to GB	-43	-27	142	211	210	304	297
I/Os to CCC	37	57	139	298	266	560	140
I/Os to GB	111	72	501	896	1516	1245	159
Fabric to CCC	204	204	204	152	185	158	158
Fabric to MSS	833	185	195	196	184	279	183
Fabric to PCIE	n/a	143	296	200	266	202	201
Fabric to FDDR	n/a	n/a	n/a	297	n/a	n/a	169
Fabric to I/Os	407	397	998	486	960	923	613
I/Os to Fabric	147	287	421	516	355	335	648
IOINFF (Bypass)	129	103	127	83	86	169	75
IOINFF (Hold)	33	48	46	47	46	46	46
IOINFF (Setup)	101	73	131	53	55	144	44

Additional delay in picoseconds, -1 speed grade, M/T2 temp 125 °C Tj

Category	M2S005	M2S010	M2S025	M2S050	M2S060	M2S090	M2S150
CCC to GB	-44	-28	146	217	215	312	304
I/Os to CCC	38	58	142	305	272	573	143
I/Os to GB	114	73	513	919	1550	1273	163
Fabric to CCC	209	209	209	155	189	162	162
Fabric to MSS	854	189	200	201	188	285	188
Fabric to PCIE	n/a	146	303	205	272	207	206
Fabric to FDDR	n/a	n/a	n/a	304	n/a	n/a	173
Fabric to I/Os	417	406	1020	498	984	946	628
I/Os to Fabric	150	293	431	529	364	343	664
IOINFF (Bypass)	132	105	130	85	88	173	77
IOINFF (Hold)	34	49	47	49	47	47	47
IOINFF (Setup)	103	75	134	54	56	148	45

Additional delay in picoseconds, -1 speed grade, T1 temp 135 °C Tj							
Category	M2S005	M2S010	M2S025	M2S050	M2S060	M2S090	M2S150
CCC to GB	-44	-28	146	218	216	313	305
I/Os to CCC	38	59	142	306	274	575	144
I/Os to GB	114	74	515	922	1556	1278	163
Fabric to CCC	210	210	210	156	190	162	163
Fabric to MSS	857	190	201	202	189	286	188
Fabric to PCIE	n/a	147	304	205	273	208	207
Fabric to FDDR	n/a	n/a	n/a	306	n/a	n/a	174
Fabric to I/Os	419	407	1024	500	988	949	631
I/Os to Fabric	151	294	432	531	365	344	667
IOINFF (Bypass)	132	106	130	85	88	174	77
IOINFF (Hold)	34	49	47	49	48	48	48
IOINFF (Setup)	104	75	135	54	56	148	45

Action Required

Customers must open their designs with Libero v11.8 SP1 and re-run the timing analysis. If there are no timing violations, no action is required. If new timing violations exist, the following options can be used to resolve them:

- Re-run place-and-route.
- Re-run place-and-route with high effort.
- Re-run place-and-route with repair min-delay option on.
- Run place-and-route with multi-pass.
- Adjust timing constraints or use Chip Planner to floorplan the affected interfaces.

CAN 17027.2

Description of Change: New recommendations on using LVDS25 and LVDS33 with a low Vid

The LVDS DC Differential Voltage specification allows the input differential voltage (Vid) range to be 100 mV to 600 mV with a typical of 350 mV. Subsequent analysis has shown that when Vid is < 300 mV the input signal is delayed by up to an additional 450 ps for LVDS25 and 280 ps for LVDS33. This delay is not accounted for in the timing model. Clock insertion delays, propagation delays, and I/O to FF delays are marginally affected. Adding a parallel termination resistor of 200 ohms +/-5% across the receiver pins can mitigate this additional delay when Vid is < 300 mV. The next revision of the datasheet will have a footnote on the new LVDS Vid recommendations indicating the additional parallel termination scheme. No customer design problems have been reported as a result of this slowdown when Vid < 300 mV.

Application Impact

- Clock to output delays are impacted.
- This variability is not relevant for source synchronous applications where both data and clock effects cancel out.
- External setup and hold and internal clock frequencies are not impacted.

Recommendations

- To avoid the slowdown observed on the receiver keep Vid ≥ 300 mV and ≤ 600 mV.
- Add a 200 ohm parallel termination resistor.

Method of Identifying Changed Product

All SmartFusion2 and IGLOO2 devices are affected.

CAN 17027.3

Addendum A - Description of Change Clarification

Description of Change: Certain I/Os driven high at the start of programming a blank (erased) device

During the start of a programming operation, customers may see an I/O driven high on bank 2 of an erased or blank device. On a blank, or erased device, the I/Os are placed in the FlashFreeze state (tristate with weak pullups) and then transition to boundary scan mode when programming starts. On I/O bank 2, there is a race condition between exiting FlashFreeze mode and entering boundary scan mode. During this transition, the outputs on bank 2 briefly drive high until the boundary scan mode is enabled. Libero SoC v11.8 SP1 will contain a fix to the bitstream generation tool that prevents this from occurring by using a JTAG command to adjust the I/O drive strength to zero before programming starts.

Application Impact

The output amplitude will track the VDDI bank voltage and will rise slightly above VDDI. For example, at VDDI of 3.3 V the output amplitude will rise above 3.3 V by approximately 0.3 V for 5 ns. The amplitude scales with VDDI, the lower the VDDI the lower the amplitude. There is no reliability impact as the duration of the output driver amplitude does not exceed the datasheet overshoot specifications.

Method of Identifying Changed Product

All SmartFusion2 and IGLOO2 devices are affected.

Action Required

If customers are concerned about this glitch then regenerate the bitstream using Libero v11.8 SP1.

CAN 17027.4

Description of Change: Digital certification has inaccurate information

The X.509 digital certificate may have the wrong device density information prior to date code 1729. All other aspects of the digital certificate are valid. Date code 1729 and after have the correct product device density field populated in the digital certificate.

Application Impact

None.

Method of Identifying Changed Product

All SmartFusion2 and IGLOO2 devices are affected.

Contact Information

If you have any questions, please contact Microsemi's SoC Technical Support at soc_tech@microsemi.com.

Regards,

Microsemi Corporation

Any projected dates in this PCN are based on the most current product information at the time this PCN is being issued, but they may change due to unforeseen circumstances. For the latest schedule and any other information, please contact your local Microsemi Sales Office, the factory contact shown above, or your local distributor.

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List of SmartFusion2 and IGLOO2 part numbers

SmartFusion2		IGLOO2	
Leaded Part	Lead-Free Parts	Leaded Part	Lead-Free Parts
M2S005-TQ144	M2S005-TQG144	M2GL005-TQ144	M2GL005-TQG144
M2S010-TQ144	M2S010-TQG144	M2GL010-TQ144	M2GL010-TQG144
M2S005-VF256	M2S005-VFG256	M2GL005-VF256	M2GL005-VFG256
M2S010-VF256	M2S010-VFG256	M2GL010-VF256	M2GL010-VFG256
M2S025-VF256	M2S025-VFG256	M2GL025-VF256	M2GL025-VFG256
M2S025-FCS325	M2S025-FCSG325	M2GL025-FCS325	M2GL025-FCSG325
M2S050-FCS325	M2S050-FCSG325	M2GL050-FCS325	M2GL050-FCSG325
M2S060-FCS325	M2S060-FCSG325	M2GL060-FCS325	M2GL060-FCSG325
M2S090-FCS325	M2S090-FCSG325	M2GL090-FCS325	M2GL090-FCSG325
M2S005-VF400	M2S005-VFG400	M2GL005-VF400	M2GL005-VFG400
M2S010-VF400	M2S010-VFG400	M2GL010-VF400	M2GL010-VFG400
M2S025-VF400	M2S025-VFG400	M2GL025-VF400	M2GL025-VFG400
M2S050-VF400	M2S050-VFG400	M2GL050-VF400	M2GL050-VFG400
M2S060-VF400	M2S060-VFG400	M2GL060-VF400	M2GL060-VFG400
M2S150-FCV484	M2S150-FCVG484	M2GL150-FCV484	M2GL150-FCVG484
M2S005-FG484	M2S005-FGG484	M2GL005-FG484	M2GL005-FGG484
M2S010-FG484	M2S010-FGG484	M2GL010-FG484	M2GL010-FGG484
M2S025-FG484	M2S025-FGG484	M2GL025-FG484	M2GL025-FGG484
M2S050-FG484	M2S050-FGG484	M2GL050-FG484	M2GL050-FGG484
M2S060-FG484	M2S060-FGG484	M2GL060-FG484	M2GL060-FGG484
M2S090-FG484	M2S090-FGG484	M2GL090-FG484	M2GL090-FGG484
M2S150-FCS536	M2S150-FCSG536	M2GL150-FCS536	M2GL150-FCSG536
M2S060-FG676	M2S060-FGG676	M2GL060-FG676	M2GL060-FGG676
M2S090-FG676	M2S090-FGG676	M2GL090-FG676	M2GL090-FGG676
M2S050-FG896	M2S050-FGG896	M2GL050-FG896	M2GL050-FGG896
M2S150-FC1152	M2S150-FCG1152	M2GL150-FC1152	M2GL150-FCG1152
M2S010T-VF256	M2S010T-VFG256	M2GL010T-VF256	M2GL010T-VFG256
M2S025T-VF256	M2S025T-VFG256	M2GL025T-VF256	M2GL025T-VFG256
M2S025T-FCS325	M2S025T-FCSG325	M2GL025T-FCS325	M2GL025T-FCSG325
M2S050T-FCS325	M2S050T-FCSG325	M2GL050T-FCS325	M2GL050T-FCSG325
M2S060T-FCS325	M2S060T-FCSG325	M2GL060T-FCS325	M2GL060T-FCSG325
M2S090T-FCS325	M2S090T-FCSG325	M2GL090T-FCS325	M2GL090T-FCSG325
M2S010T-VF400	M2S010T-VFG400	M2GL010T-VF400	M2GL010T-VFG400
M2S025T-VF400	M2S025T-VFG400	M2GL025T-VF400	M2GL025T-VFG400
M2S050T-VF400	M2S050T-VFG400	M2GL050T-VF400	M2GL050T-VFG400
M2S060T-VF400	M2S060T-VFG400	M2GL060T-VF400	M2GL060T-VFG400
M2S150T-FCV484	M2S150T-FCVG484	M2GL150T-FCV484	M2GL150T-FCVG484

M2S010T-FG484	M2S010T-FGG484	M2GL010T-FG484	M2GL010T-FGG484
M2S025T-FG484	M2S025T-FGG484	M2GL025T-FG484	M2GL025T-FGG484
M2S050T-FG484	M2S050T-FGG484	M2GL050T-FG484	M2GL050T-FGG484
M2S060T-FG484	M2S060T-FGG484	M2GL060T-FG484	M2GL060T-FGG484
M2S090T-FG484	M2S090T-FGG484	M2GL090T-FG484	M2GL090T-FGG484
M2S150T-FCS536	M2S150T-FCSG536	M2GL150T-FCS536	M2GL150T-FCSG536
M2S060T-FG676	M2S060T-FGG676	M2GL060T-FG676	M2GL060T-FGG676
M2S090T-FG676	M2S090T-FGG676	M2GL090T-FG676	M2GL090T-FGG676
M2S050T-FG896	M2S050T-FGG896	M2GL050T-FG896	M2GL050T-FGG896
M2S150T-FC1152	M2S150T-FCG1152	M2GL150T-FC1152	M2GL150T-FCG1152
M2S005S-TQ144	M2S005S-TQG144	M2GL005S-TQ144	M2GL005S-TQG144
M2S010S-TQ144	M2S010S-TQG144	M2GL010S-TQ144	M2GL010S-TQG144
M2S005S-VF256	M2S005S-VFG256	M2GL005S-VF256	M2GL005S-VFG256
M2S005S-VF400	M2S005S-VFG400	M2GL005S-VF400	M2GL005S-VFG400
M2S005S-FG484	M2S005S-FGG484	M2GL005S-FG484	M2GL005S-FGG484
M2S010TS-VF256	M2S010TS-VFG256	M2GL010TS-VF256	M2GL010TS-VFG256
M2S025TS-VF256	M2S025TS-VFG256	M2GL025TS-VF256	M2GL025TS-VFG256
M2S025TS-FCS325	M2S025TS-FCSG325	M2GL025TS-FCS325	M2GL025TS-FCSG325
M2S050TS-FCS325	M2S050TS-FCSG325	M2GL050TS-FCS325	M2GL050TS-FCSG325
M2S060TS-FCS325	M2S060TS-FCSG325	M2GL060TS-FCS325	M2GL060TS-FCSG325
M2S090TS-FCS325	M2S090TS-FCSG325	M2GL090TS-FCS325	M2GL090TS-FCSG325
M2S010TS-VF400	M2S010TS-VFG400	M2GL010TS-VF400	M2GL010TS-VFG400
M2S025TS-VF400	M2S025TS-VFG400	M2GL025TS-VF400	M2GL025TS-VFG400
M2S050TS-VF400	M2S050TS-VFG400	M2GL050TS-VF400	M2GL050TS-VFG400
M2S060TS-VF400	M2S060TS-VFG400	M2GL060TS-VF400	M2GL060TS-VFG400
M2S150TS-FCV484	M2S150TS-FCVG484	M2GL150TS-FCV484	M2GL150TS-FCVG484
M2S010TS-FG484	M2S010TS-FGG484	M2GL010TS-FG484	M2GL010TS-FGG484
M2S025TS-FG484	M2S025TS-FGG484	M2GL025TS-FG484	M2GL025TS-FGG484
M2S050TS-FG484	M2S050TS-FGG484	M2GL050TS-FG484	M2GL050TS-FGG484
M2S060TS-FG484	M2S060TS-FGG484	M2GL060TS-FG484	M2GL060TS-FGG484
M2S090TS-FG484	M2S090TS-FGG484	M2GL090TS-FG484	M2GL090TS-FGG484
M2S150TS-FCS536	M2S150TS-FCSG536	M2GL150TS-FCS536	M2GL150TS-FCSG536
M2S060TS-FG676	M2S060TS-FGG676	M2GL060TS-FG676	M2GL060TS-FGG676
M2S090TS-FG676	M2S090TS-FGG676	M2GL090TS-FG676	M2GL090TS-FGG676
M2S050TS-FG896	M2S050TS-FGG896	M2GL050TS-FG896	M2GL050TS-FGG896
M2S150TS-FC1152	M2S150TS-FCG1152	M2GL150TS-FC1152	M2GL150TS-FCG1152
M2S005S-1TQ144	M2S005S-1TQG144	M2GL005S-1TQ144	M2GL005S-1TQG144
M2S010S-1TQ144	M2S010S-1TQG144	M2GL010S-1TQ144	M2GL010S-1TQG144
M2S005S-1VF256	M2S005S-1VFG256	M2GL005S-1VF256	M2GL005S-1VFG256
M2S010S-1VF256	M2S010S-1VFG256	M2GL010S-1VF256	M2GL010S-1VFG256
M2S025S-1VF256	M2S025S-1VFG256	M2GL025S-1VF256	M2GL025S-1VFG256

M2S025-1FCS325	M2S025-1FCSG325	M2GL025-1FCS325	M2GL025-1FCSG325
M2S050-1FCS325	M2S050-1FCSG325	M2GL050-1FCS325	M2GL050-1FCSG325
M2S060-1FCS325	M2S060-1FCSG325	M2GL060-1FCS325	M2GL060-1FCSG325
M2S090-1FCS325	M2S090-1FCSG325	M2GL090-1FCS325	M2GL090-1FCSG325
M2S005-1VF400	M2S005-1VFG400	M2GL005-1VF400	M2GL005-1VFG400
M2S010-1VF400	M2S010-1VFG400	M2GL010-1VF400	M2GL010-1VFG400
M2S025-1VF400	M2S025-1VFG400	M2GL025-1VF400	M2GL025-1VFG400
M2S050-1VF400	M2S050-1VFG400	M2GL050-1VF400	M2GL050-1VFG400
M2S060-1VF400	M2S060-1VFG400	M2GL060-1VF400	M2GL060-1VFG400
M2S150-1FCV484	M2S150-1FCVG484	M2GL150-1FCV484	M2GL150-1FCVG484
M2S005-1FG484	M2S005-1FGG484	M2GL005-1FG484	M2GL005-1FGG484
M2S010-1FG484	M2S010-1FGG484	M2GL010-1FG484	M2GL010-1FGG484
M2S025-1FG484	M2S025-1FGG484	M2GL025-1FG484	M2GL025-1FGG484
M2S050-1FG484	M2S050-1FGG484	M2GL050-1FG484	M2GL050-1FGG484
M2S060-1FG484	M2S060-1FGG484	M2GL060-1FG484	M2GL060-1FGG484
M2S090-1FG484	M2S090-1FGG484	M2GL090-1FG484	M2GL090-1FGG484
M2S150-1FCS536	M2S150-1FCSG536	M2GL150-1FCS536	M2GL150-1FCSG536
M2S060-1FG676	M2S060-1FGG676	M2GL060-1FG676	M2GL060-1FGG676
M2S090-1FG676	M2S090-1FGG676	M2GL090-1FG676	M2GL090-1FGG676
M2S050-1FG896	M2S050-1FGG896	M2GL050-1FG896	M2GL050-1FGG896
M2S150-1FC1152	M2S150-1FCG1152	M2GL150-1FC1152	M2GL150-1FCG1152
M2S010T-1VF256	M2S010T-1VFG256	M2GL010T-1VF256	M2GL010T-1VFG256
M2S025T-1VF256	M2S025T-1VFG256	M2GL025T-1VF256	M2GL025T-1VFG256
M2S025T-1FCS325	M2S025T-1FCSG325	M2GL025T-1FCS325	M2GL025T-1FCSG325
M2S050T-1FCS325	M2S050T-1FCSG325	M2GL050T-1FCS325	M2GL050T-1FCSG325
M2S060T-1FCS325	M2S060T-1FCSG325	M2GL060T-1FCS325	M2GL060T-1FCSG325
M2S090T-1FCS325	M2S090T-1FCSG325	M2GL090T-1FCS325	M2GL090T-1FCSG325
M2S010T-1VF400	M2S010T-1VFG400	M2GL010T-1VF400	M2GL010T-1VFG400
M2S025T-1VF400	M2S025T-1VFG400	M2GL025T-1VF400	M2GL025T-1VFG400
M2S050T-1VF400	M2S050T-1VFG400	M2GL050T-1VF400	M2GL050T-1VFG400
M2S060T-1VF400	M2S060T-1VFG400	M2GL060T-1VF400	M2GL060T-1VFG400
M2S150T-1FCV484	M2S150T-1FCVG484	M2GL150T-1FCV484	M2GL150T-1FCVG484
M2S010T-1FG484	M2S010T-1FGG484	M2GL010T-1FG484	M2GL010T-1FGG484
M2S025T-1FG484	M2S025T-1FGG484	M2GL025T-1FG484	M2GL025T-1FGG484
M2S050T-1FG484	M2S050T-1FGG484	M2GL050T-1FG484	M2GL050T-1FGG484
M2S060T-1FG484	M2S060T-1FGG484	M2GL060T-1FG484	M2GL060T-1FGG484
M2S090T-1FG484	M2S090T-1FGG484	M2GL090T-1FG484	M2GL090T-1FGG484
M2S150T-1FCS536	M2S150T-1FCSG536	M2GL150T-1FCS536	M2GL150T-1FCSG536
M2S060T-1FG676	M2S060T-1FGG676	M2GL060T-1FG676	M2GL060T-1FGG676
M2S090T-1FG676	M2S090T-1FGG676	M2GL090T-1FG676	M2GL090T-1FGG676
M2S050T-1FG896	M2S050T-1FGG896	M2GL050T-1FG896	M2GL050T-1FGG896

M2S150T-1FC1152	M2S150T-1FCG1152	M2GL150T-1FC1152	M2GL150T-1FCG1152
M2S005S-1TQ144	M2S005S-1TQG144	M2GL005S-1TQ144	M2GL005S-1TQG144
M2S010S-1TQ144	M2S010S-1TQG144	M2GL010S-1TQ144	M2GL010S-1TQG144
M2S005S-1VF256	M2S005S-1VFG256	M2GL005S-1VF256	M2GL005S-1VFG256
M2S005S-1VF400	M2S005S-1VFG400	M2GL005S-1VF400	M2GL005S-1VFG400
M2S005S-1FG484	M2S005S-1FGG484	M2GL005S-1FG484	M2GL005S-1FGG484
M2S010TS-1VF256	M2S010TS-1VFG256	M2GL010TS-1VF256	M2GL010TS-1VFG256
M2S025TS-1VF256	M2S025TS-1VFG256	M2GL025TS-1VF256	M2GL025TS-1VFG256
M2S025TS-1FCS325	M2S025TS-1FCSG325	M2GL025TS-1FCS325	M2GL025TS-1FCSG325
M2S050TS-1FCS325	M2S050TS-1FCSG325	M2GL050TS-1FCS325	M2GL050TS-1FCSG325
M2S060TS-1FCS325	M2S060TS-1FCSG325	M2GL060TS-1FCS325	M2GL060TS-1FCSG325
M2S090TS-1FCS325	M2S090TS-1FCSG325	M2GL090TS-1FCS325	M2GL090TS-1FCSG325
M2S010TS-1VF400	M2S010TS-1VFG400	M2GL010TS-1VF400	M2GL010TS-1VFG400
M2S025TS-1VF400	M2S025TS-1VFG400	M2GL025TS-1VF400	M2GL025TS-1VFG400
M2S050TS-1VF400	M2S050TS-1VFG400	M2GL050TS-1VF400	M2GL050TS-1VFG400
M2S060TS-1VF400	M2S060TS-1VFG400	M2GL060TS-1VF400	M2GL060TS-1VFG400
M2S150TS-1FCV484	M2S150TS-1FCVG484	M2GL150TS-1FCV484	M2GL150TS-1FCVG484
M2S010TS-1FG484	M2S010TS-1FGG484	M2GL010TS-1FG484	M2GL010TS-1FGG484
M2S025TS-1FG484	M2S025TS-1FGG484	M2GL025TS-1FG484	M2GL025TS-1FGG484
M2S050TS-1FG484	M2S050TS-1FGG484	M2GL050TS-1FG484	M2GL050TS-1FGG484
M2S060TS-1FG484	M2S060TS-1FGG484	M2GL060TS-1FG484	M2GL060TS-1FGG484
M2S090TS-1FG484	M2S090TS-1FGG484	M2GL090TS-1FG484	M2GL090TS-1FGG484
M2S150TS-1FCS536	M2S150TS-1FCSG536	M2GL150TS-1FCS536	M2GL150TS-1FCSG536
M2S060TS-1FG676	M2S060TS-1FGG676	M2GL060TS-1FG676	M2GL060TS-1FGG676
M2S090TS-1FG676	M2S090TS-1FGG676	M2GL090TS-1FG676	M2GL090TS-1FGG676
M2S050TS-1FG896	M2S050TS-1FGG896	M2GL050TS-1FG896	M2GL050TS-1FGG896
M2S150TS-1FC1152	M2S150TS-1FCG1152	M2GL150TS-1FC1152	M2GL150TS-1FCG1152
M2S005-TQ144I	M2S005-TQG144I	M2GL005-TQ144I	M2GL005-TQG144I
M2S010-TQ144I	M2S010-TQG144I	M2GL010-TQ144I	M2GL010-TQG144I
M2S005-VF256I	M2S005-VFG256I	M2GL005-VF256I	M2GL005-VFG256I
M2S010-VF256I	M2S010-VFG256I	M2GL010-VF256I	M2GL010-VFG256I
M2S025-VF256I	M2S025-VFG256I	M2GL025-VF256I	M2GL025-VFG256I
M2S025-FCS325I	M2S025-FCSG325I	M2GL025-FCS325I	M2GL025-FCSG325I
M2S050-FCS325I	M2S050-FCSG325I	M2GL050-FCS325I	M2GL050-FCSG325I
M2S060-FCS325I	M2S060-FCSG325I	M2GL060-FCS325I	M2GL060-FCSG325I
M2S090-FCS325I	M2S090-FCSG325I	M2GL090-FCS325I	M2GL090-FCSG325I
M2S005-VF400I	M2S005-VFG400I	M2GL005-VF400I	M2GL005-VFG400I
M2S010-VF400I	M2S010-VFG400I	M2GL010-VF400I	M2GL010-VFG400I
M2S025-VF400I	M2S025-VFG400I	M2GL025-VF400I	M2GL025-VFG400I
M2S050-VF400I	M2S050-VFG400I	M2GL050-VF400I	M2GL050-VFG400I
M2S060-VF400I	M2S060-VFG400I	M2GL060-VF400I	M2GL060-VFG400I

M2S150-FCV484I	M2S150-FCVG484I	M2GL150-FCV484I	M2GL150-FCVG484I
M2S005-FG484I	M2S005-FGG484I	M2GL005-FG484I	M2GL005-FGG484I
M2S010-FG484I	M2S010-FGG484I	M2GL010-FG484I	M2GL010-FGG484I
M2S025-FG484I	M2S025-FGG484I	M2GL025-FG484I	M2GL025-FGG484I
M2S050-FG484I	M2S050-FGG484I	M2GL050-FG484I	M2GL050-FGG484I
M2S060-FG484I	M2S060-FGG484I	M2GL060-FG484I	M2GL060-FGG484I
M2S090-FG484I	M2S090-FGG484I	M2GL090-FG484I	M2GL090-FGG484I
M2S150-FCS536I	M2S150-FCSG536I	M2GL150-FCS536I	M2GL150-FCSG536I
M2S060-FG676I	M2S060-FGG676I	M2GL060-FG676I	M2GL060-FGG676I
M2S090-FG676I	M2S090-FGG676I	M2GL090-FG676I	M2GL090-FGG676I
M2S050-FG896I	M2S050-FGG896I	M2GL050-FG896I	M2GL050-FGG896I
M2S150-FC1152I	M2S150-FCG1152I	M2GL150-FC1152I	M2GL150-FCG1152I
M2S010T-VF256I	M2S010T-VFG256I	M2GL010T-VF256I	M2GL010T-VFG256I
M2S025T-VF256I	M2S025T-VFG256I	M2GL025T-VF256I	M2GL025T-VFG256I
M2S025T-FCS325I	M2S025T-FCSG325I	M2GL025T-FCS325I	M2GL025T-FCSG325I
M2S050T-FCS325I	M2S050T-FCSG325I	M2GL050T-FCS325I	M2GL050T-FCSG325I
M2S060T-FCS325I	M2S060T-FCSG325I	M2GL060T-FCS325I	M2GL060T-FCSG325I
M2S090T-FCS325I	M2S090T-FCSG325I	M2GL090T-FCS325I	M2GL090T-FCSG325I
M2S010T-VF400I	M2S010T-VFG400I	M2GL010T-VF400I	M2GL010T-VFG400I
M2S025T-VF400I	M2S025T-VFG400I	M2GL025T-VF400I	M2GL025T-VFG400I
M2S050T-VF400I	M2S050T-VFG400I	M2GL050T-VF400I	M2GL050T-VFG400I
M2S060T-VF400I	M2S060T-VFG400I	M2GL060T-VF400I	M2GL060T-VFG400I
M2S150T-FCV484I	M2S150T-FCVG484I	M2GL150T-FCV484I	M2GL150T-FCVG484I
M2S010T-FG484I	M2S010T-FGG484I	M2GL010T-FG484I	M2GL010T-FGG484I
M2S025T-FG484I	M2S025T-FGG484I	M2GL025T-FG484I	M2GL025T-FGG484I
M2S050T-FG484I	M2S050T-FGG484I	M2GL050T-FG484I	M2GL050T-FGG484I
M2S060T-FG484I	M2S060T-FGG484I	M2GL060T-FG484I	M2GL060T-FGG484I
M2S090T-FG484I	M2S090T-FGG484I	M2GL090T-FG484I	M2GL090T-FGG484I
M2S150T-FCS536I	M2S150T-FCSG536I	M2GL150T-FCS536I	M2GL150T-FCSG536I
M2S060T-FG676I	M2S060T-FGG676I	M2GL060T-FG676I	M2GL060T-FGG676I
M2S090T-FG676I	M2S090T-FGG676I	M2GL090T-FG676I	M2GL090T-FGG676I
M2S050T-FG896I	M2S050T-FGG896I	M2GL050T-FG896I	M2GL050T-FGG896I
M2S150T-FC1152I	M2S150T-FCG1152I	M2GL150T-FC1152I	M2GL150T-FCG1152I
M2S005S-TQ144I	M2S005S-TQG144I	M2GL005S-TQ144I	M2GL005S-TQG144I
M2S010S-TQ144I	M2S010S-TQG144I	M2GL010S-TQ144I	M2GL010S-TQG144I
M2S005S-VF256I	M2S005S-VFG256I	M2GL005S-VF256I	M2GL005S-VFG256I
M2S005S-VF400I	M2S005S-VFG400I	M2GL005S-VF400I	M2GL005S-VFG400I
M2S005S-FG484I	M2S005S-FGG484I	M2GL005S-FG484I	M2GL005S-FGG484I
M2S010TS-VF256I	M2S010TS-VFG256I	M2GL010TS-VF256I	M2GL010TS-VFG256I
M2S025TS-VF256I	M2S025TS-VFG256I	M2GL025TS-VF256I	M2GL025TS-VFG256I
M2S025TS-FCS325I	M2S025TS-FCSG325I	M2GL025TS-FCS325I	M2GL025TS-FCSG325I

M2S050TS-FCS325I	M2S050TS-FCSG325I	M2GL050TS-FCS325I	M2GL050TS-FCSG325I
M2S060TS-FCS325I	M2S060TS-FCSG325I	M2GL060TS-FCS325I	M2GL060TS-FCSG325I
M2S090TS-FCS325I	M2S090TS-FCSG325I	M2GL090TS-FCS325I	M2GL090TS-FCSG325I
M2S010TS-VF400I	M2S010TS-VFG400I	M2GL010TS-VF400I	M2GL010TS-VFG400I
M2S025TS-VF400I	M2S025TS-VFG400I	M2GL025TS-VF400I	M2GL025TS-VFG400I
M2S050TS-VF400I	M2S050TS-VFG400I	M2GL050TS-VF400I	M2GL050TS-VFG400I
M2S060TS-VF400I	M2S060TS-VFG400I	M2GL060TS-VF400I	M2GL060TS-VFG400I
M2S150TS-FCV484I	M2S150TS-FCVG484I	M2GL150TS-FCV484I	M2GL150TS-FCVG484I
M2S010TS-FG484I	M2S010TS-FGG484I	M2GL010TS-FG484I	M2GL010TS-FGG484I
M2S025TS-FG484I	M2S025TS-FGG484I	M2GL025TS-FG484I	M2GL025TS-FGG484I
M2S050TS-FG484I	M2S050TS-FGG484I	M2GL050TS-FG484I	M2GL050TS-FGG484I
M2S060TS-FG484I	M2S060TS-FGG484I	M2GL060TS-FG484I	M2GL060TS-FGG484I
M2S090TS-FG484I	M2S090TS-FGG484I	M2GL090TS-FG484I	M2GL090TS-FGG484I
M2S150TS-FCS536I	M2S150TS-FCSG536I	M2GL150TS-FCS536I	M2GL150TS-FCSG536I
M2S060TS-FG676I	M2S060TS-FGG676I	M2GL060TS-FG676I	M2GL060TS-FGG676I
M2S090TS-FG676I	M2S090TS-FGG676I	M2GL090TS-FG676I	M2GL090TS-FGG676I
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M2S150TS-FC1152I	M2S150TS-FCG1152I	M2GL150TS-FC1152I	M2GL150TS-FCG1152I
M2S005-1TQ144I	M2S005-1TQG144I	M2GL005-1TQ144I	M2GL005-1TQG144I
M2S010-1TQ144I	M2S010-1TQG144I	M2GL010-1TQ144I	M2GL010-1TQG144I
M2S005-1VF256I	M2S005-1VFG256I	M2GL005-1VF256I	M2GL005-1VFG256I
M2S010-1VF256I	M2S010-1VFG256I	M2GL010-1VF256I	M2GL010-1VFG256I
M2S025-1VF256I	M2S025-1VFG256I	M2GL025-1VF256I	M2GL025-1VFG256I
M2S025-1FCS325I	M2S025-1FCSG325I	M2GL025-1FCS325I	M2GL025-1FCSG325I
M2S050-1FCS325I	M2S050-1FCSG325I	M2GL050-1FCS325I	M2GL050-1FCSG325I
M2S060-1FCS325I	M2S060-1FCSG325I	M2GL060-1FCS325I	M2GL060-1FCSG325I
M2S090-1FCS325I	M2S090-1FCSG325I	M2GL090-1FCS325I	M2GL090-1FCSG325I
M2S005-1VF400I	M2S005-1VFG400I	M2GL005-1VF400I	M2GL005-1VFG400I
M2S010-1VF400I	M2S010-1VFG400I	M2GL010-1VF400I	M2GL010-1VFG400I
M2S025-1VF400I	M2S025-1VFG400I	M2GL025-1VF400I	M2GL025-1VFG400I
M2S050-1VF400I	M2S050-1VFG400I	M2GL050-1VF400I	M2GL050-1VFG400I
M2S060-1VF400I	M2S060-1VFG400I	M2GL060-1VF400I	M2GL060-1VFG400I
M2S150-1FCV484I	M2S150-1FCVG484I	M2GL150-1FCV484I	M2GL150-1FCVG484I
M2S005-1FG484I	M2S005-1FGG484I	M2GL005-1FG484I	M2GL005-1FGG484I
M2S010-1FG484I	M2S010-1FGG484I	M2GL010-1FG484I	M2GL010-1FGG484I
M2S025-1FG484I	M2S025-1FGG484I	M2GL025-1FG484I	M2GL025-1FGG484I
M2S050-1FG484I	M2S050-1FGG484I	M2GL050-1FG484I	M2GL050-1FGG484I
M2S060-1FG484I	M2S060-1FGG484I	M2GL060-1FG484I	M2GL060-1FGG484I
M2S090-1FG484I	M2S090-1FGG484I	M2GL090-1FG484I	M2GL090-1FGG484I
M2S150-1FCS536I	M2S150-1FCSG536I	M2GL150-1FCS536I	M2GL150-1FCSG536I
M2S060-1FG676I	M2S060-1FGG676I	M2GL060-1FG676I	M2GL060-1FGG676I

M2S090-1FG676I	M2S090-1FGG676I	M2GL090-1FG676I	M2GL090-1FGG676I
M2S050-1FG896I	M2S050-1FGG896I	M2GL050-1FG896I	M2GL050-1FGG896I
M2S150-1FC1152I	M2S150-1FCG1152I	M2GL150-1FC1152I	M2GL150-1FCG1152I
M2S010T-1VF256I	M2S010T-1VFG256I	M2GL010T-1VF256I	M2GL010T-1VFG256I
M2S025T-1VF256I	M2S025T-1VFG256I	M2GL025T-1VF256I	M2GL025T-1VFG256I
M2S025T-1FCS325I	M2S025T-1FCSG325I	M2GL025T-1FCS325I	M2GL025T-1FCSG325I
M2S050T-1FCS325I	M2S050T-1FCSG325I	M2GL050T-1FCS325I	M2GL050T-1FCSG325I
M2S060T-1FCS325I	M2S060T-1FCSG325I	M2GL060T-1FCS325I	M2GL060T-1FCSG325I
M2S090T-1FCS325I	M2S090T-1FCSG325I	M2GL090T-1FCS325I	M2GL090T-1FCSG325I
M2S010T-1VF400I	M2S010T-1VFG400I	M2GL010T-1VF400I	M2GL010T-1VFG400I
M2S025T-1VF400I	M2S025T-1VFG400I	M2GL025T-1VF400I	M2GL025T-1VFG400I
M2S050T-1VF400I	M2S050T-1VFG400I	M2GL050T-1VF400I	M2GL050T-1VFG400I
M2S060T-1VF400I	M2S060T-1VFG400I	M2GL060T-1VF400I	M2GL060T-1VFG400I
M2S150T-1FCV484I	M2S150T-1FCVG484I	M2GL150T-1FCV484I	M2GL150T-1FCVG484I
M2S010T-1FG484I	M2S010T-1FGG484I	M2GL010T-1FG484I	M2GL010T-1FGG484I
M2S025T-1FG484I	M2S025T-1FGG484I	M2GL025T-1FG484I	M2GL025T-1FGG484I
M2S050T-1FG484I	M2S050T-1FGG484I	M2GL050T-1FG484I	M2GL050T-1FGG484I
M2S060T-1FG484I	M2S060T-1FGG484I	M2GL060T-1FG484I	M2GL060T-1FGG484I
M2S090T-1FG484I	M2S090T-1FGG484I	M2GL090T-1FG484I	M2GL090T-1FGG484I
M2S150T-1FCS536I	M2S150T-1FCSG536I	M2GL150T-1FCS536I	M2GL150T-1FCSG536I
M2S060T-1FG676I	M2S060T-1FGG676I	M2GL060T-1FG676I	M2GL060T-1FGG676I
M2S090T-1FG676I	M2S090T-1FGG676I	M2GL090T-1FG676I	M2GL090T-1FGG676I
M2S050T-1FG896I	M2S050T-1FGG896I	M2GL050T-1FG896I	M2GL050T-1FGG896I
M2S150T-1FC1152I	M2S150T-1FCG1152I	M2GL150T-1FC1152I	M2GL150T-1FCG1152I
M2S005S-1TQ144I	M2S005S-1TQG144I	M2GL005S-1TQ144I	M2GL005S-1TQG144I
M2S010S-1TQ144I	M2S010S-1TQG144I	M2GL010S-1TQ144I	M2GL010S-1TQG144I
M2S005S-1VF256I	M2S005S-1VFG256I	M2GL005S-1VF256I	M2GL005S-1VFG256I
M2S005S-1VF400I	M2S005S-1VFG400I	M2GL005S-1VF400I	M2GL005S-1VFG400I
M2S005S-1FG484I	M2S005S-1FGG484I	M2GL005S-1FG484I	M2GL005S-1FGG484I
M2S010TS-1VF256I	M2S010TS-1VFG256I	M2GL010TS-1VF256I	M2GL010TS-1VFG256I
M2S025TS-1VF256I	M2S025TS-1VFG256I	M2GL025TS-1VF256I	M2GL025TS-1VFG256I
M2S025TS-1FCS325I	M2S025TS-1FCSG325I	M2GL025TS-1FCS325I	M2GL025TS-1FCSG325I
M2S050TS-1FCS325I	M2S050TS-1FCSG325I	M2GL050TS-1FCS325I	M2GL050TS-1FCSG325I
M2S060TS-1FCS325I	M2S060TS-1FCSG325I	M2GL060TS-1FCS325I	M2GL060TS-1FCSG325I
M2S090TS-1FCS325I	M2S090TS-1FCSG325I	M2GL090TS-1FCS325I	M2GL090TS-1FCSG325I
M2S010TS-1VF400I	M2S010TS-1VFG400I	M2GL010TS-1VF400I	M2GL010TS-1VFG400I
M2S025TS-1VF400I	M2S025TS-1VFG400I	M2GL025TS-1VF400I	M2GL025TS-1VFG400I
M2S050TS-1VF400I	M2S050TS-1VFG400I	M2GL050TS-1VF400I	M2GL050TS-1VFG400I
M2S060TS-1VF400I	M2S060TS-1VFG400I	M2GL060TS-1VF400I	M2GL060TS-1VFG400I
M2S150TS-1FCV484I	M2S150TS-1FCVG484I	M2GL150TS-1FCV484I	M2GL150TS-1FCVG484I
M2S010TS-1FG484I	M2S010TS-1FGG484I	M2GL010TS-1FG484I	M2GL010TS-1FGG484I

M2S025TS-1FG484I	M2S025TS-1FGG484I	M2GL025TS-1FG484I	M2GL025TS-1FGG484I
M2S050TS-1FG484I	M2S050TS-1FGG484I	M2GL050TS-1FG484I	M2GL050TS-1FGG484I
M2S060TS-1FG484I	M2S060TS-1FGG484I	M2GL060TS-1FG484I	M2GL060TS-1FGG484I
M2S090TS-1FG484I	M2S090TS-1FGG484I	M2GL090TS-1FG484I	M2GL090TS-1FGG484I
M2S150TS-1FCS536I	M2S150TS-1FCSG536I	M2GL150TS-1FCS536I	M2GL150TS-1FCSG536I
M2S060TS-1FG676I	M2S060TS-1FGG676I	M2GL060TS-1FG676I	M2GL060TS-1FGG676I
M2S090TS-1FG676I	M2S090TS-1FGG676I	M2GL090TS-1FG676I	M2GL090TS-1FGG676I
M2S050TS-1FG896I	M2S050TS-1FGG896I	M2GL050TS-1FG896I	M2GL050TS-1FGG896I
M2S150TS-1FC1152I	M2S150TS-1FCG1152I	M2GL150TS-1FC1152I	M2GL150TS-1FCG1152I
M2S010T-1FG484M	M2S010T-1FGG484M	M2GL010T-1FG484M	M2GL010T-1FGG484M
M2S025T-1FG484M	M2S025T-1FGG484M	M2GL025T-1FG484M	M2GL025T-1FGG484M
M2S050T-1FG484M	M2S050T-1FGG484M	M2GL050T-1FG484M	M2GL050T-1FGG484M
M2S060T-1FG484M	M2S060T-1FGG484M	M2GL060T-1FG484M	M2GL060T-1FGG484M
M2S090T-1FG484M	M2S090T-1FGG484M	M2GL090T-1FG484M	M2GL090T-1FGG484M
M2S150T-1FC1152M	M2S150T-1FCG1152M	M2GL150T-1FC1152M	M2GL150T-1FCG1152M
M2S010TS-1FG484M	M2S010TS-1FGG484M	M2GL010TS-1FG484M	M2GL010TS-1FGG484M
M2S025TS-1FG484M	M2S025TS-1FGG484M	M2GL025TS-1FG484M	M2GL025TS-1FGG484M
M2S050TS-1FG484M	M2S050TS-1FGG484M	M2GL050TS-1FG484M	M2GL050TS-1FGG484M
M2S060TS-1FG484M	M2S060TS-1FGG484M	M2GL060TS-1FG484M	M2GL060TS-1FGG484M
M2S090TS-1FG484M	M2S090TS-1FGG484M	M2GL090TS-1FG484M	M2GL090TS-1FGG484M
M2S150TS-1FC1152M	M2S150TS-1FCG1152M	M2GL150TS-1FC1152M	M2GL150TS-1FCG1152M
	M2S005S-1FGG484T2		M2GL005S-1FGG484T1
	M2S010TS-1FGG484T2		M2GL010S-1FGG484T1
	M2S025TS-1FGG484T2		M2GL025S-1FGG484T1
	M2S060TS-1FGG484T2		M2GL060S-1FGG484T1
	M2S090TS-1FGG484T2		M2GL090S-1FGG484T1
	M2S005S-1VFG256T2		M2GL005S-1FGG484T2
	M2S010TS-1VFG256T2		M2GL010TS-1FGG484T2
	M2S025TS-1VFG256T2		M2GL025TS-1FGG484T2
	M2S005S-1VFG400T2		M2GL060TS-1FGG484T2
	M2S010TS-1VFG400T2		M2GL090TS-1FGG484T2
	M2S025TS-1VFG400T2		M2GL005S-1VFG256T2
	M2S060TS-1VFG400T2		M2GL010TS-1VFG256T2
	M2S060TS-1FGG676T2		M2GL025TS-1VFG256T2
	M2S090TS-1FGG676T2		M2GL005S-1VFG400T2
			M2GL010TS-1VFG400T2
			M2GL025TS-1VFG400T2
			M2GL060TS-1VFG400T2
			M2GL060TS-1FGG676T2
			M2GL090TS-1FGG676T2

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