13. Package Information for Stratix Devices

S53008-3.0

Introduction

This data sheet provides package information for Altera® devices. It includes these sections:

In this data sheet, packages are listed in order of ascending pin count.

Device & Package Cross Reference

Table 13–1 shows which Altera Stratix® devices are available in BGA, FineLine BGA and Ultra FineLine BGA packages.

Table 13–1. Stratix Devices in BGA, FineLine BGA & Ultra FineLine BGA Packages (Part 1 of 2)

Device	Package	Pins
EP1S10	Flip-chip FineLine BGA	484
	BGA	672
	FineLine BGA	672
	Flip-chip FineLine BGA	780
EP1S20	Flip-chip FineLine BGA	484
	BGA	672
	FineLine BGA	672
	Flip-chip FineLine BGA	780
EP1S25	BGA	672
	FineLine BGA	672
	Flip-chip FineLine BGA	780
	Flip-chip FineLine BGA	1,020
EP1S30	Flip-chip FineLine BGA	780
	Flip-chip BGA	956
	Flip-chip FineLine BGA	1,020

Table 13–1. Stratix Devices in BGA, FineLine BGA & Ultra FineLine BGA Packages (Part 2 of 2)

Device	Package	Pins
EP1S40	Flip-chip FineLine BGA	780
	Flip-chip BGA	956
	Flip-chip FineLine BGA	1,020
	Flip-chip FineLine BGA	1,508
EP1S60	Flip-chip BGA	956
	Flip-chip FineLine BGA	1,020
	Flip-chip FineLine BGA	1,508
EP1S80	Flip-chip BGA	956
	Flip-chip FineLine BGA	1,020
	Flip-chip FineLine BGA	1,508

Thermal Resistance

Table 13–2 provides θ_{JA} (junction-to-ambient thermal resistance) and θ_{JC} (junction-to-case thermal resistance) values for Altera Stratix devices.

Table 13–2. Thermal Resistance of Stratix Devices (Part 1 of 2)

Device	Pin Count	Package	θ_{JC} (° C/W)	θ_{JA} (° C/W) Still Air	θ_{JA} (° C/W) 100 ft./min.	θ_{JA} (° C/W) 200 ft./min.	θ_{JA} (° C/W) 400 ft./min.
EP1S10	484	FineLine BGA	0.38	11.9	9.8	8.4	7.2
	672	BGA	3.2	16.8	13.7	11.9	10.5
	672	FineLine BGA	3.4	17.2	14	12.2	10.8
	780	FineLine BGA	0.43	10.9	8.8	7.4	6.3
EP1S20	484	FineLine BGA	0.30	11.8	9.7	8.3	7.1
	672	BGA	2.5	15.5	12.4	10.7	9.3
	672	FineLine BGA	2.7	16	12.8	11	9.6
	780	FineLine BGA	0.31	10.7	8.6	7.2	6.1

Table 13–2. Thermal Resistance of Stratix Devices (Part 2 of 2)

Device	Pin Count	Package	θ_{JC} (° C/W)	θ_{JA} (° C/W) Still Air	θ_{JA} (° C/W) 100 ft./min.	θ_{JA} (° C/W) 200 ft./min.	θ_{JA} (° C/W) 400 ft./min.
EP1S25	672	BGA	2.2	14.8	11.7	10.0	8.7
	672	FineLine BGA	2.3	15.3	12	10.4	9
	780	FineLine BGA	0.25	10.5	8.5	7.1	6.0
	1020	FineLine BGA	0.25	10.0	8.0	6.6	5.5
EP1S30	780	FineLine BGA	0.2	10.4	8.4	7.0	5.9
	956	BGA	0.2	9.1	7.1	5.8	4.8
	1020	FineLine BGA	0.2	9.9	7.9	6.5	5.4
EP1S40	780	FineLine BGA	0.17	10.4	8.3	6.9	5.8
	956	BGA	0.18	9.0	7.0	5.7	4.7
	1020	FineLine BGA	0.17	9.8	7.8	6.4	5.3
	1508	FineLine BGA	0.18	9.1	7.1	5.8	4.7
EP1S60	956	BGA	0.13	8.9	6.9	5.6	4.6
	1020	FineLine BGA	0.13	9.7	7.7	6.3	5.2
	1508	FineLine BGA	0.13	8.9	7.0	5.6	4.6
EP1S80	956	BGA	0.1	8.8	6.8	5.5	4.5
	1020	FineLine BGA	0.1	9.6	7.6	6.2	5.1
	1508	FineLine BGA	0.1	8.8	6.9	5.5	4.5

Package Outlines

The package outlines on the following pages are listed in order of ascending pin count. Altera package outlines meet the requirements of *JEDEC Publication No. 95.*

484-Pin FineLine BGA - Flip Chip

- All dimensions and tolerances conform to ASME Y14.5M – 1994.
- Controlling dimension is in millimeters.
- Pin A1 may be indicated by an ID dot, or a special feature, in its proximity on the package surface.

Tables 13–3 and 13–4 show the package information and package outline figure references, respectively, for the 484-pin FineLine BGA packaging.

Table 13–3. 484-Pin FineLine BGA Package Information

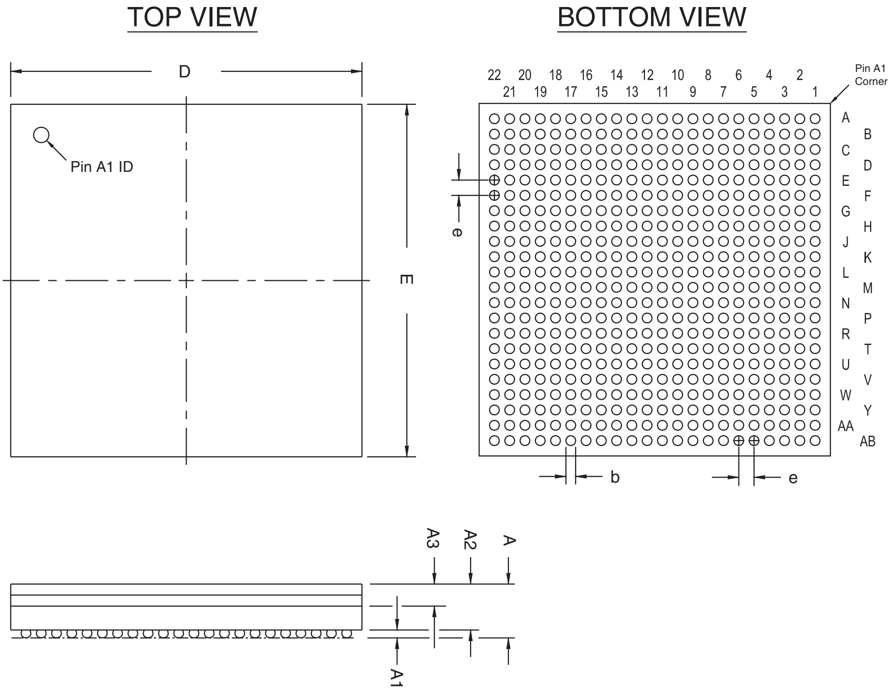
Description	Specification
Ordering code reference	F
Package acronym	FineLine BGA
Substrate material	BT
Solder ball composition	Regular: 63Sn:37Pb (Typ.) Pb-free: Sn:3Ag:0.5Cu (Typ.)
JEDEC outline reference	MS-034 variation: AAJ-1
Maximum lead coplanarity	0.008 inches (0.20 mm)
Weight	5.8 g
Moisture sensitivity level	Printed on moisture barrier bag

Table 13–4. 484-Pin FineLine BGA Package Outline Dimensions

Symbol	Millimeter		
	Min.	Nom.	Max.
A	–	–	3.50
A1	0.30	–	–
A2	0.25	–	3.00
A3	–	–	2.50
D	23.00 BSC		
E	23.00 BSC		
b	0.50	0.60	0.70
e	1.00 BSC		

Figure 13–1 shows a package outline for the 484-pin FineLine BGA packaging.

Figure 13–1. 484-Pin FineLine BGA Package Outline



672-Pin FineLine BGA - Flip Chip

- All dimensions and tolerances conform to ASME Y14.5M - 1994.
- Controlling dimension is in millimeters.
- Pin A1 may be indicated by an ID dot, or a special feature, in its proximity on package surface.

Tables 13–5 and 13–6 show the package information and package outline figure references, respectively, for the 672-pin FineLine BGA packaging.

Table 13–5. 672-Pin FineLine BGA Package Information

Description	Specification
Ordering code reference	F
Package acronym	FineLine BGA
Substrate material	BT
Solder ball composition	Regular: 63Sn:37Pb (Typ.) Pb-free: Sn:3Ag:0.5Cu (Typ.)
JEDEC Outline Reference	MS-034 Variation: AAL-1
Maximum lead coplanarity	0.008 inches (0.20 mm)
Weight	7.7 g
Moisture sensitivity level	Printed on moisture barrier bag

Table 13–6. 672-Pin FineLine BGA Package Outline Dimensions

Symbol	Millimeters		
	Min.	Nom.	Max.
A	–	–	3.50
A1	0.30	–	–
A2	0.25	–	3.00
A3	–	–	2.50
D	27.00 BSC		
E	27.00 BSC		
b	0.50	0.60	0.70
e	1.00 BSC		

Figure 13–2 shows a package outline for the 672-pin FineLine BGA packaging.

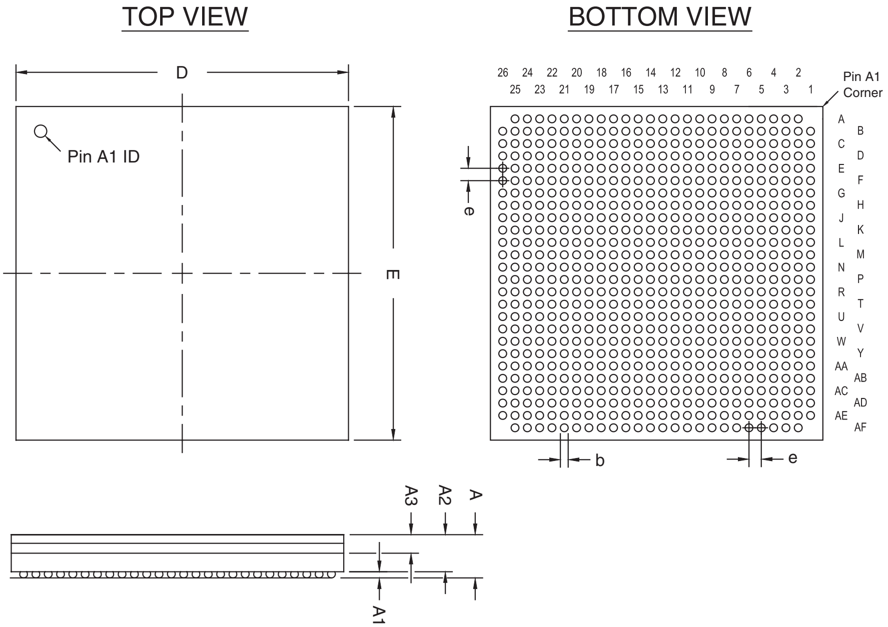


Figure 13–2. 672-Pin FineLine BGA Package Outline

780-Pin FineLine BGA - Flip Chip

- All dimensions and tolerances conform to ASME Y14.5M - 1994.
- Controlling dimension is in millimeters.
- Pin A1 may be indicated by an ID dot, or a special feature, in its proximity on package surface.

Tables 13–7 and 13–8 show the package information and package outline figure references, respectively, for the 780-pin FineLine BGA packaging.

Table 13–7. 780-Pin FineLine BGA Package Information

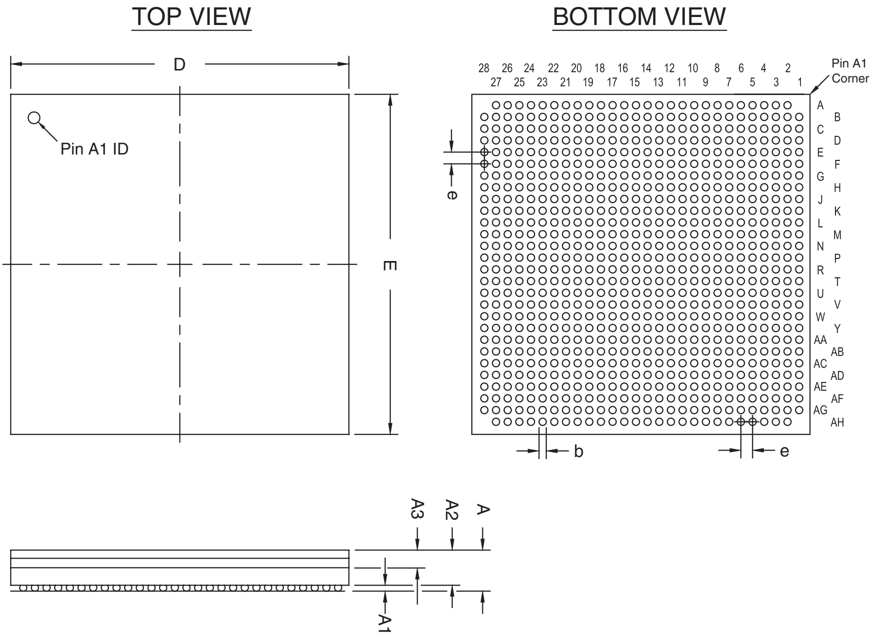
Description	Specification
Ordering code reference	F
Package acronym	FineLine BGA
Substrate material	BT
Solder ball composition	Regular: 63Sn:37Pb (Typ.) Pb-free: Sn:3Ag:0.5Cu (Typ.)
JEDEC outline reference	MS-034 variation: AAM-1
Maximum lead coplanarity	0.008 inches (0.20 mm)
Weight	8.9 g
Moisture sensitivity level	Printed on moisture barrier bag

Table 13–8. 780-Pin FineLine BGA Package Outline Dimensions

Symbol	Millimeters		
	Min.	Nom.	Max.
A	–	–	3.50
A1	0.30	–	–
A2	0.25	–	3.00
A3	–	–	2.50
D	29.00 BSC		
E	29.00 BSC		
b	0.50	0.60	0.70
e	1.00 BSC		

Figure 13–3 shows a package outline for the 780-pin FineLine BGA packaging.

Figure 13–3. 780-Pin FineLine BGA Package Outline



956-Pin Ball Grid Array (BGA) - Flip Chip

- All dimensions and tolerances conform to ASME Y14.5M - 1994.
- Controlling dimension is in millimeters.
- Pin A1 may be indicated by an ID dot, or a special feature, in its proximity on package surface.

Tables 13–9 and 13–10 show the package information and package outline figure references, respectively, for the 956-pin BGA packaging.

Table 13–9. 956-Pin BGA Package Information

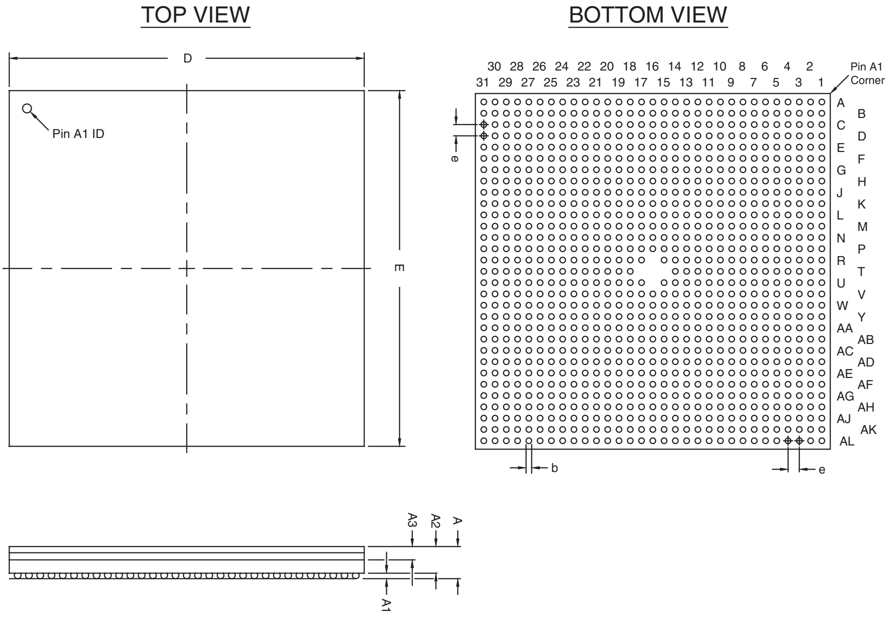
Description	Specification
Ordering code reference	B
Package acronym	BGA
Substrate material	BT
Solder ball composition	Regular: 63Sn:37Pb (Typ.) Pb-free: Sn:3Ag:0.5Cu (Typ.)
JEDEC outline reference	MS-034 Variation: BAU-1
Maximum lead coplanarity	0.008 inches (0.20 mm)
Weight	14.6 g
Moisture sensitivity level	Printed on moisture barrier bag

Table 13–10. 956-Pin BGA Package Outline Dimensions

Symbol	Millimeters		
	Min.	Nom.	Max.
A	–	–	3.50
A1	0.30	–	–
A2	0.25	–	3.00
A3	–	–	2.50
D	40.00 BSC		
E	40.00 BSC		
b	0.60	0.75	0.90
e	1.27 BSC		

Figure 13–4 shows a package outline for the 956-pin BGA packaging.

Figure 13–4. 956-Pin BGA Package Outline



1,020-Pin FineLine BGA - Flip Chip

- All dimensions and tolerances conform to ASME Y14.5M - 1994.
- Controlling dimension is in millimeters.
- Pin A1 may be indicated by an ID dot, or a special feature, in its proximity on package surface.

Tables 13–11 and 13–12 show the package information and package outline figure references, respectively, for the 1,020-pin FineLine BGA packaging.

Table 13–11. 1,020 FineLine BGA Package Information

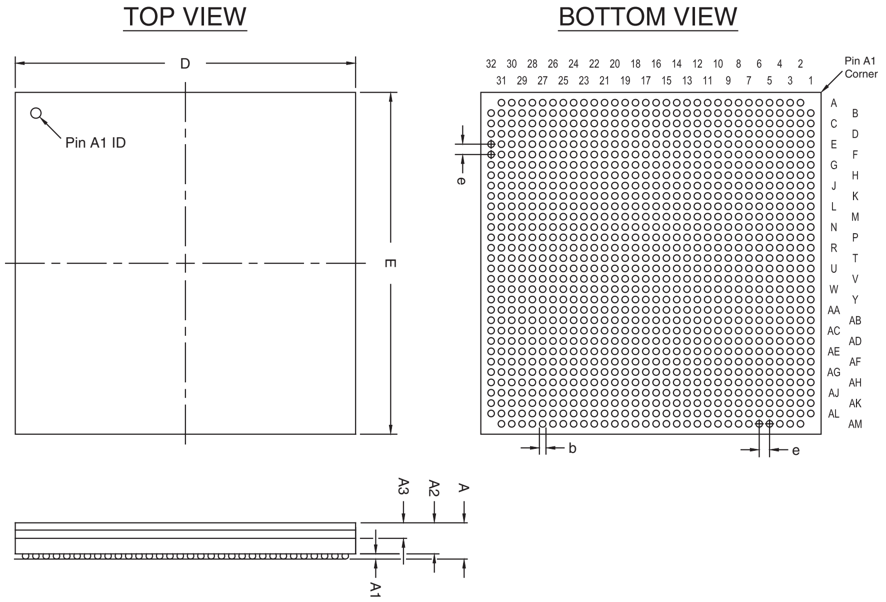
Description	Specification
Ordering code reference	F
Package acronym	FineLine BGA
Substrate material	BT
Solder ball composition	Regular: 63Sn:37Pb (Typ.) Pb-free: Sn:3Ag:0.5Cu (Typ.)
JEDEC outline reference	MS-034 variation: AAP-1
Maximum lead coplanarity	0.008 inches (0.20 mm)
Weight	11.5 g
Moisture sensitivity level	Printed on moisture barrier bag

Table 13–12. 1,020-Pin FineLine BGA Package Outline Dimensions

Symbol	Millimeters		
	Min.	Nom.	Max.
A	–	–	3.50
A1	0.30	–	–
A2	0.25	–	3.00
A3	–	–	2.50
D	33.00 BSC		
E	33.00 BSC		
b	0.50	0.60	0.70
e	1.00 BSC		

Figure 13–5 shows a package outline for the 1,020-pin FineLine BGA packaging.

Figure 13–5. 1,020-Pin FineLine BGA Package Outline



1,508-Pin FineLine BGA - Flip Chip

- All dimensions and tolerances conform to ASME Y14.5M - 1994.
- Controlling dimension is in millimeters.
- Pin A1 may be indicated by an ID dot, or a special feature, in its proximity on package surface.

Tables 13–13 and 13–14 show the package information and package outline figure references, respectively, for the 1,508-pin FineLine BGA packaging.

Table 13–13. 1,508-Pin FineLine BGA Package Information

Description	Specification
Ordering code reference	F
Package acronym	FineLine BGA
Substrate material	BT
Solder ball composition	Regular: 63Sn:37Pb (Typ.) Pb-free: Sn:3Ag:0.5Cu (Typ.)
JEDEC outline reference	MS-034 Variation: AAU-1
Maximum lead coplanarity	0.008 inches (0.20 mm)
Weight	14.6 g
Moisture sensitivity level	Printed on moisture barrier bag

Table 13–14. 1,508-Pin FineLine BGA Package Outline Dimensions

Symbol	Millimeters		
	Min.	Nom.	Max.
A	–	–	3.50
A1	0.30	–	–
A2	0.25	–	3.00
A3	–	–	2.50
D	40.00 BSC		
E	40.00 BSC		
b	0.50	0.60	0.70
e	1.00 BSC		

Figure 13–6 shows a package outline for the 1,508-pin FineLine BGA packaging.

Figure 13–6. 1,508-Pin FineLine BGA Package Outline