Configuration Schemes

You can load the configuration data for a Stratix II GX device with one of five configuration schemes (refer to Table 3–4), chosen on the basis of the target application. You can use a configuration device, intelligent controller, or the JTAG port to configure a Stratix II GX device. A configuration device can automatically configure a Stratix II GX device at system power-up.

Multiple Stratix II GX devices can be configured in any of the five configuration schemes by connecting the configuration enable (nCE) and configuration enable output (nCEO) pins on each device. Stratix II GX FPGAs offer the following:

- Configuration data decompression to reduce configuration file storage
- Design security using configuration data encryption to protect designs
- Remote system upgrades for remotely updating Stratix II GX designs

Table 3–4 summarizes which configuration features can be used in each configuration scheme.

Refer to the *Configuring Stratix II & Stratix II GX Devices* chapter in volume 2 of the *Stratix II GX Device Handbook* for more information about configuration schemes in Stratix II GX devices.

Table 3–4. Stratix II GX Configuration Features (Part 1 of 2)

Configuration Scheme	Configuration Method	Design Security	Decompression	Remote System Upgrade
FPP	MAX II device or microprocessor and flash device	✓ *(1)*	✓ *(1)*	✓
	Enhanced configuration device		✓ *(2)*	✓
AS	Serial configuration device	✓	✓	✓ *(3)*
PS	MAX II device or microprocessor and flash device	✓	✓	✓
	Enhanced configuration device	✓	✓	✓
	Download cable *(4)*	✓	✓	
PPA	MAX II device or microprocessor and flash device			✓

Table 3–4. Stratix II GX Configuration Features (Part 2 of 2)

Configuration Scheme	Configuration Method	Design Security	Decompression	Remote System Upgrade
JTAG	Download cable *(4)*			
	MAX II device or microprocessor and flash device			

Notes for Table 3–4:

(1) In these modes, the host system must send a DCLK that is 4× the data rate.

(2) The enhanced configuration device decompression feature is available, while the Stratix II GX decompression feature is not available.

(3) Only remote update mode is supported when using the AS configuration scheme. Local update mode is not supported.

(4) The supported download cables include the Altera USB-Blaster universal serial bus (USB) port download cable, MasterBlaster serial/USB communications cable, ByteBlaster II parallel port download cable, and the ByteBlasterMV parallel port download cable.

Device Security Using Configuration Bitstream Encryption

Stratix II and Stratix II GX FPGAs are the industry's first FPGAs with the ability to decrypt a configuration bitstream using the AES algorithm. When using the design security feature, a 128-bit security key is stored in the Stratix II GX FPGA. To successfully configure a Stratix II GX FPGA that has the design security feature enabled, the device must be configured with a configuration file that was encrypted using the same 128-bit security key. The security key can be stored in non-volatile memory inside the Stratix II GX device. This nonvolatile memory does not require any external devices, such as a battery back up, for storage.

An encrypted configuration file is the same size as a non-encrypted configuration file. When using a serial configuration scheme such as passive serial (PS) or active serial (AS), configuration time is the same whether or not the design security feature is enabled. If the fast passive parallel (FPP) scheme is used with the design security or decompression feature, a 4× DCLK is required. This results in a slower configuration time when compared to the configuration time of an FPGA that has neither the design security nor the decompression feature enabled. For more information about this feature, contact an Altera sales representative.

Device Configuration Data Decompression

Stratix II GX FPGAs support decompression of configuration data, which saves configuration memory space and time. This feature allows you to store compressed configuration data in configuration devices or other

EP2AGZ350FH29I4N	60000	DIP-8	20+	ALTERA
EP2AGZ350HF40I3N	3000	SMD	20+	ALTERA
EP2AGZ350HF40I4N	5800	SMD	20+	ALTERA
EP2S130F1020C3N	160	FCBGA	20+	ALTERA
EP2S130F1020C4N	200	BGA	20+	ALTERA
EP2S130F1020C5N	237	FCBGA1738	20+	ALTERA
EP2S130F1020I4	300	BGA	20+	ALTERA
EP2S130F1020I4N	34	BGA	20+	ALTERA/INTER
EP2S130F1020I4N	252	BGA	20+	ALTERA
EP2S15F484C4	200	FBGA	20+	ALTERA
EP2S15F484C4N	109	FBGA	20+	ALTERA
EP2S15F484C5	200	BGA	20+	ALTERA
EP2S15F484C5N	120	FCBGA	20+	ALTERA
EP2S180F1020C3	160	FCBGA	20+	ALTERA
EP2S180F1020C3N	160	FCBGA	20+	ALTERA
EP2S180F1020I4	100	BGA	20+	ALTERA
EP2S180F1020I4N	84	FBGA1517	20+	ALTERA
EP2S180F1508C3N	172	BGA	20+	ALTERA
EP2S180F1508I4	180	BGA	20+	ALTERA
EP2S180F1508I4N	280	BGA	20+	ALTERA
EP2S30F484C3N	213	FCBGA1156	20+	ALTERA
EP2S30F484C4N	56	FCBGA1157	20+	ALTERA
EP2S30F484C5N	32640	SOP	20+	ALTERA
EP2S30F484I4N	326	FCBGA1153	20+	ALTERA
EP2S30F672C5N	286	FCBGA324	20+	ALTERA
EP2S30F672I4N	105	FCBGA324	20+	ALTERA
EP2S60F1020C3N	106	FCBGA1928	20+	ALTERA
EP2S60F1020C4N	156	BGA	20+	ALTERA
EP2S60F1020C4N	40	BGA	20+	ALTERA/INTER
EP2S60F1020C5N	459	BGA	20+	ALTERA
EP2S60F1020C5N	9	BGA	20+	ALTERA/INTER
EP2S60F1020C5N	186	FCBGA1156	20+	ALTERA
EP2S60F1020I4	50	BGA	20+	ALTERA
EP2S60F1020I4	23	BGA	20+	ALTERA/INTER
EP2S60F1020I4N	3150	BGA	20+	ALTERA
EP2S60F1020I4N	234	FCBGA1738	20+	ALTERA
EP2S60F484C4N	147	BGA	20+	ALTERA

4. DC and Switching Characteristics

Operating Conditions

Stratix® II GX devices are offered in both commercial and industrial grades. Industrial devices are offered in -4 speed grade and commercial devices are offered in -3 (fastest), -4, and -5 speed grades.

Tables 4–1 through 4–51 provide information on absolute maximum ratings, recommended operating conditions, DC electrical characteristics, and other specifications for Stratix II GX devices.

Absolute Maximum Ratings

Table 4–1 contains the absolute maximum ratings for the Stratix II GX device family.

Table 4–1. Stratix II GX Device Absolute Maximum Ratings *Notes (1), (2), (3)*

Symbol	Parameter	Conditions	Minimum	Maximum	Unit
V_{CCINT}	Supply voltage	With respect to ground	–0.5	1.8	V
V_{CCIO}	Supply voltage	With respect to ground	–0.5	4.6	V
V_{CCPD}	Supply voltage	With respect to ground	–0.5	4.6	V
V_I	DC input voltage *(4)*		–0.5	4.6	V
I_{OUT}	DC output current, per pin		–25	40	mA
T_{STG}	Storage temperature	No bias	–65	150	C
T_J	Junction temperature	BGA packages under bias	–55	125	C

Notes to Table 4–1:

(1) See the *Operating Requirements for Altera Devices Data Sheet* for more information.

(2) Conditions beyond those listed in Table 4–1 may cause permanent damage to a device. Additionally, device operation at the absolute maximum ratings for extended periods of time may have adverse affects on the device.

(3) Supply voltage specifications apply to voltage readings taken at the device pins, not at the power supply.

(4) During transitions, the inputs may overshoot to the voltage shown in Table 4–2 based upon the input duty cycle. The DC case is equivalent to 100% duty cycle. During transitions, the inputs may undershoot to –2.0 V for input currents less than 100 mA and periods shorter than 20 ns.

EP2S60F1020C5N	9	BGA	20+	ALTERA/INTER
EP2S60F1020C5N	186	FCBGA1156	20+	ALTERA
EP2S60F1020I4	50	BGA	20+	ALTERA
EP2S60F1020I4	23	BGA	20+	ALTERA/INTER
EP2S60F1020I4N	3150	BGA	20+	ALTERA
EP2S60F1020I4N	234	FCBGA1738	20+	ALTERA
EP2S60F484C4N	147	BGA	20+	ALTERA
EP2S60F484C5	130	BGA	20+	ALTERA
EP2S60F484C5N	100	BGA	20+	ALTERA
EP2S60F484C5N	4800	SOP	20+	ALTERA
EP2S60F484I4	96	BGA	20+	ALTERA
EP2S60F484I4N	173	FCBGA1156	20+	ALTERA
EP2S60F672C3	10	BGA	20+	ALTERA
EP2S60F672C3N	115	BGA	20+	ALTERA
EP2S60F672C3N	105	FCBGA	20+	ALTERA
EP2S60F672C4	200	FCBGA	20+	ALTERA
EP2S60F672C4N	200	FCBGA	20+	ALTERA
EP2S60F672C5	160	FCBGA	20+	ALTERA
EP2S60F672C5N	3447	BGA	20+	ALTERA
EP2S60F672I4	160	FCBGA	20+	ALTERA
EP2S60F672I4N	911	BGA	20+	ALTERA
EP2S60F672I4N	347	FCBGA668	20+	ALTERA
EP2S60F672I5	3000	BGA	20+	ALTERA
EP2S60F672I5N	116	FBGA676	20+	ALTERA
EP2S90F1020C3	122	BGA	20+	ALTERA
EP2S90F1020C3N	120	FBGA	20+	ALTERA
EP2S90F1020C4	120	FBGA	20+	ALTERA
EP2S90F1020C4N	300	FBGA	20+	ALTERA
EP2S90F1020C4N	300	BGA	20+	ALTERA
EP2S90F1020C5N	368	FCBGA1156	20+	ALTERA
EP2S90F1020I3N	482	BGA	20+	ALTERA
EP2S90F1020I4N	897	BGA	20+	ALTERA
EP2S90F1020I4N	50	BGA	20+	ALTERA/INTER
EP2S90F1020I4N	283	FCBGA901	20+	ALTERA
EP2S90F1508C5N	448	BGA	20+	ALTERA
EP2SGX130GF1508C3N	6	BGA	20+	Intel/Altera
EP2SGX130GF1508C3N	109	FCBGA900	20+	ALTERA