Low Power Peak EMI Reducing Solution

Features

- Generates an EMI optimized clock signal at the output.
- Integrated loop filter components.
- Operates with a 3.3 / 2.5V Supply.
- Operating current less than 4mA.
- Low power CMOS design.
- Input frequency range: 13MHz to 30MHz for 2.5V
  : 13MHz to 30MHz for 3.3V
- Generates a 1X low EMI spread spectrum clock of the input frequency.
- Spread Spectrum Enable Control.
- Frequency deviation: ±1% @ 24MHz
- Available in 6-pin TSOT-23, 8-pin SOIC and 8-pin TSSOP packages.

Product Description

The ASM3P2579A is a versatile spread spectrum frequency modulator designed specifically for a wide range of clock frequencies. The ASM3P2579A reduces electromagnetic interference (EMI) at the clock source, allowing system wide reduction of EMI of all clock dependent signals. The ASM3P2579A allows significant system cost savings by reducing the number of circuit board layers ferrite beads, shielding that are traditionally required to pass EMI regulations.

The ASM3P2579A uses the most efficient and optimized modulation profile approved by the FCC and is implemented by using a proprietary all digital method.

The ASM3P2579A modulates the output of a single PLL in order to “spread” the bandwidth of a synthesized clock, and more importantly, decreases the peak amplitudes of its harmonics. This results in significantly lower system EMI compared to the typical narrow band signal produced by oscillators and most frequency generators. Lowering EMI by increasing a signal’s bandwidth is called ‘spread spectrum clock generation’.

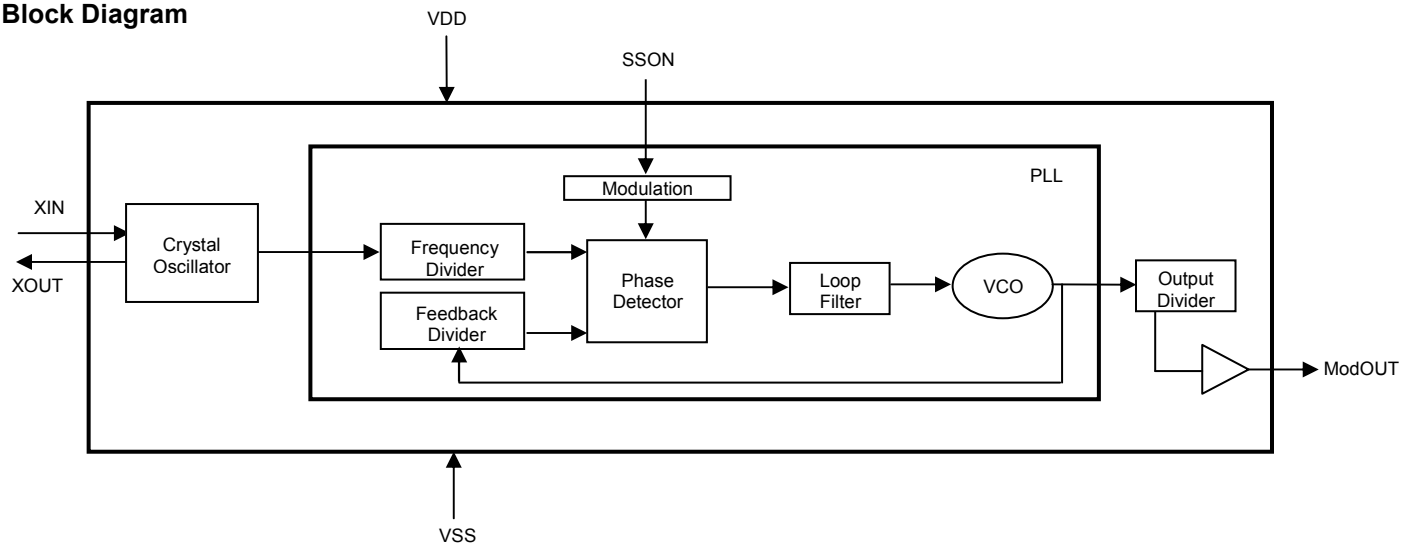
Applications

The ASM3P2579A is targeted towards all portable devices with very low power requirements like MP3 players and digital still cameras.

Key Specifications

Description	Specification
Supply voltages	V_{DD} = 3.3V/2.5V
Cycle-to-Cycle Jitter	200 pS (Max)
Output Duty Cycle	45/55% (worst case)
Modulation Rate Equation	F_{IN}/640
Frequency Deviation	±1% @ 24MHz

Block Diagram



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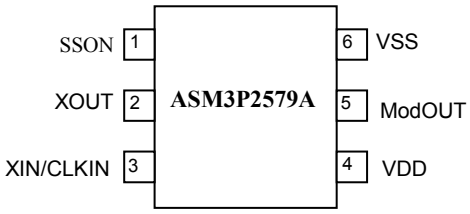
2575, Augustine Drive • Santa Clara, CA • Tel: 408.855.4900 • Fax: 408.855.4999 • www.alsc.com

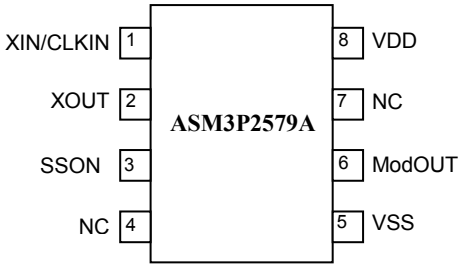
Pin Configuration (6-pin TSOT-23 Package)



Pin Description

Pin#	Pin Name	Type	Description
1	SSON	I	When SSON is HIGH, the spread spectrum is enabled and when LOW, it turns off the spread spectrum. Connect the pin to ground When Spread Spectrum feature is not required.
2	XOUT	O	Crystal connection. If using an external reference, this pin must be left unconnected.
3	XIN/CLKIN	I	Crystal connection or external reference frequency input. This pin has dual functions. It can be connected either to an external crystal or an external reference clock.
4	VDD	P	Power supply for the entire chip
5	ModOUT	O	Spread spectrum clock output.
6	VSS	P	Ground connection.

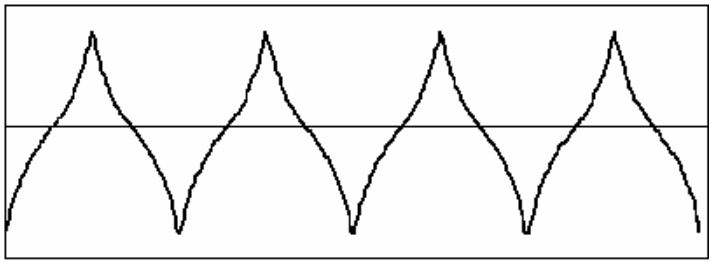
Pin Configuration (8-pin SOIC and TSSOP Package)



Pin Description

Pin#	Pin Name	Type	Description
1	XIN/CLKIN	I	Crystal connection or external reference frequency input. This pin has dual functions. It can be connected either to an external crystal or an external reference clock.
2	XOUT	O	Crystal connection. If using an external reference, this pin must be left unconnected.
3	SSON	I	When SSON is HIGH, the spread spectrum is enabled and when LOW, it turns off the spread spectrum. Connect the pin to ground When Spread Spectrum feature is not required.
4	NC	–	No connect.
5	VSS	P	Ground connection.
6	ModOUT	O	Spread spectrum clock output.
7	NC	–	No connect.
8	VDD	P	Power supply for the entire chip

Modulation Profile



Specifications

Description	Specification
Frequency Range	13MHz < CLKIN < 30MHz
Modulation Equation	$F_{IN}/640$
Frequency Deviation	±1% @ 24MHz

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V_{DD}, V_{IN}	Voltage on any pin with respect to Ground	0.5 to +7.0	V
T_{STG}	Storage temperature	-65 to +125	°C
T_A	Operating temperature	0 to 70	°C
T_s	Max. Soldering Temperature (10 sec)	260	°C
T_J	Junction Temperature	150	°C
T_{DV}	Static Discharge Voltage (As per MIL-STD-883, Method 3015)	2	KV

Note: These are stress ratings only and are not implied for functional use. Exposure to absolute maximum ratings for prolonged periods of time may affect device reliability.

DC Electrical Characteristics for 2.5V Supply

(Test condition: All parameters are measured at room temperature (+25°C) unless otherwise stated)

Symbol	Parameter	Min	Typ	Max	Unit
V_{IL}	Input low voltage	GND - 0.3	–	0.8	V
V_{IH}	Input high voltage	2.0	–	V_{DD} + 0.3	V
I_{IL}	Input low current	–	–	-35	µA
I_{IH}	Input high current	–	–	35	µA
I_{XOL}	XOUT output low current (@0.5V, V_{DD}=2.5V)	–	3	–	mA
I_{XOH}	XOUT output high current (@1.8V, V_{DD}=2.5V)	–	3	–	mA
V_{OL}	Output low voltage (V_{DD} = 2.5 V, I_{OL} = 8 mA)	–	–	0.6	V
V_{OH}	Output high voltage (V_{DD} = 2.5 V, I_{OH} = 8 mA)	1.8	–	–	V
I_{DD}	Static supply current *	–	1.1	–	mA
I_{CC}	Dynamic supply current (2.5V, 24MHz and no load)	–	3.5	–	mA
V_{DD}	Operating voltage	2.375	2.5	2.625	V
t_{ON}	Power-up time (first locked cycle after power-up)	–	–	5	mS
Z_{OUT}	Output impedance	–	50	–	Ω

* XIN/CLKIN is made low.

AC Electrical Characteristics for 2.5V Supply

Symbol	Parameter		Min	Typ	Max	Unit
CLKIN	Input frequency		13	–	30	MHz
ModOUT	Output frequency		13	–	30	MHz
f_d	Frequency Deviation	Input Frequency = 13MHz	–	–	±1.57	%
		Input Frequency = 30MHz	–	–	±0.80	
t_{LH}*	Output rise time (measured from 0.7V to 1.7V)		0.7	1.5	1.9	nS
t_{HL}*	Output fall time (measured from 1.7V to 0.7V)		0.4	1.0	1.1	nS
t_{JC}	Jitter (cycle to cycle)		–	–	200	pS
t_D	Output duty cycle		45	50	55	%

* t_{LH} and t_{HL} are measured into a capacitive load of 15pF

rev 0.3

DC Electrical Characteristics for 3.3V Supply

(Test condition: All parameters are measured at room temperature (+25°C) unless otherwise stated)

Symbol	Parameter	Min	Typ	Max	Unit
V_{IL}	Input low voltage	GND - 0.3	–	0.8	V
V_{IH}	Input high voltage	2.0	–	V_{DD} + 0.3	V
I_{IL}	Input low current	–	–	-35	µA
I_{IH}	Input high current	–	–	35	µA
I_{XOL}	XOUT output low current (@0.4V, V_{DD}=3.3V)	–	3	–	mA
I_{XOH}	XOUT output high current (@2.5V, V_{DD}=3.3V)	–	3	–	mA
V_{OL}	Output low voltage (V_{DD} = 3.3 V, I_{OL} = 8 mA)	–	–	0.4	V
V_{OH}	Output high voltage (V_{DD} = 3.3 V, I_{OH} = 8 mA)	2.5	–	–	V
I_{DD}	Static supply current*	–	1.2	–	mA
I_{CC}	Dynamic supply current (3.3V, 24MHz and no load)	–	4.0	–	mA
V_{DD}	Operating voltage	2.7	3.3	3.6	V
t_{ON}	Power-up time (first locked cycle after power-up)	–	–	5	mS
Z_{OUT}	Output impedance	–	45	–	Ω

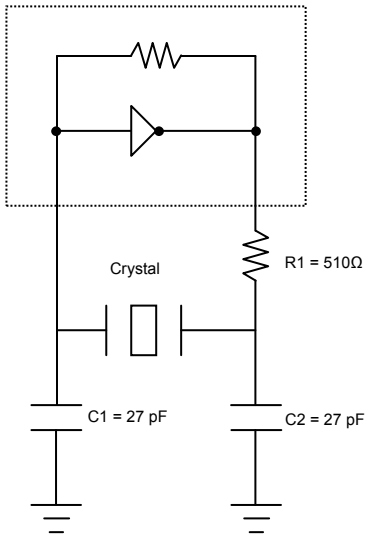
* XIN/CLKIN is made low.

AC Electrical Characteristics for 3.3V Supply

Symbol	Parameter		Min	Typ	Max	Unit
CLKIN	Input frequency		13	–	30	MHz
ModOUT	Output frequency		13	–	30	MHz
f_d	Frequency Deviation	Input Frequency = 13MHz	–	–	±1.57	%
		Input Frequency = 30MHz	–	–	±0.80	
t_{LH}*	Output rise time (measured from 0.8 to 2.0V)		0.5	1.4	1.7	nS
t_{HL}*	Output fall time (measured at 2.0V to 0.8V)		0.4	1.0	1.2	nS
t_{JC}	Jitter (cycle to cycle)		–	–	200	pS
t_D	Output duty cycle		45	50	55	%

*t_{LH} and t_{HL} are measured into a capacitive load of 15pF

Typical Crystal Oscillator Circuit

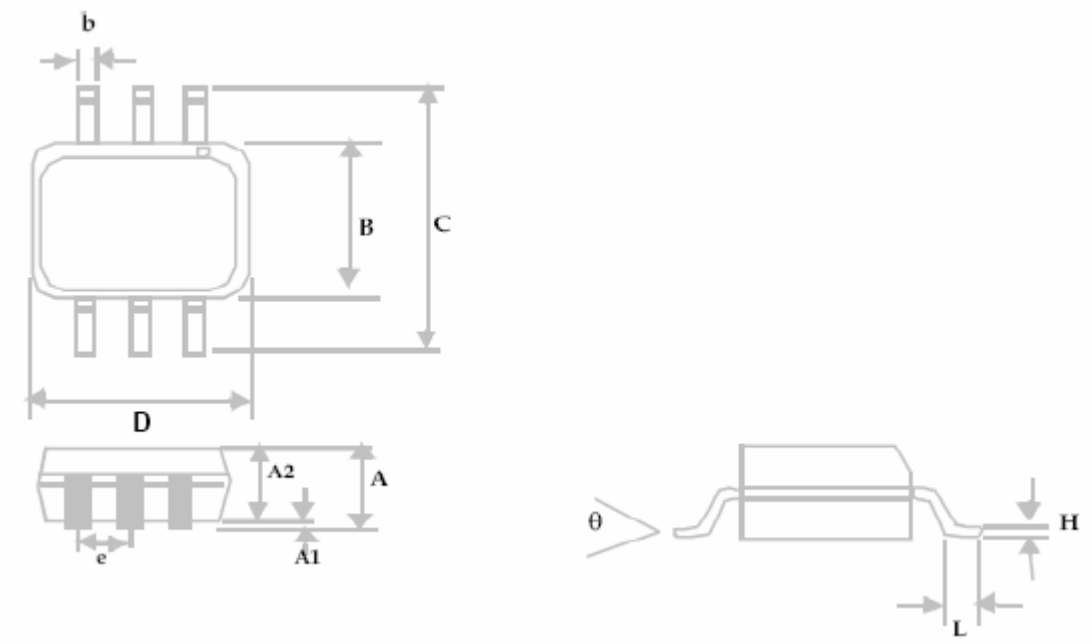


Typical Crystal Specifications

Fundamental AT cut parallel resonant crystal	
Nominal frequency	14.31818 MHz
Frequency tolerance	± 50 ppm or better at 25°C
Operating temperature range	-25°C to +85°C
Storage temperature	-40°C to +85°C
Load capacitance	18pF
Shunt capacitance	7pF maximum
ESR	25 Ω

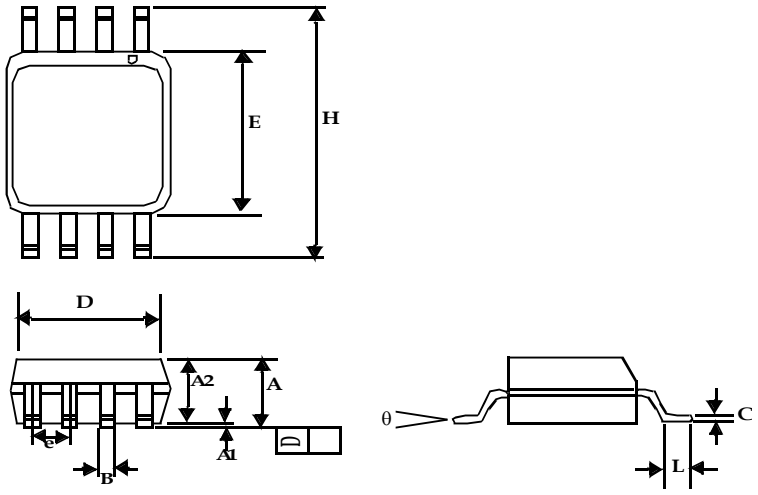
Package Information

6-pin TSOT-23 Package



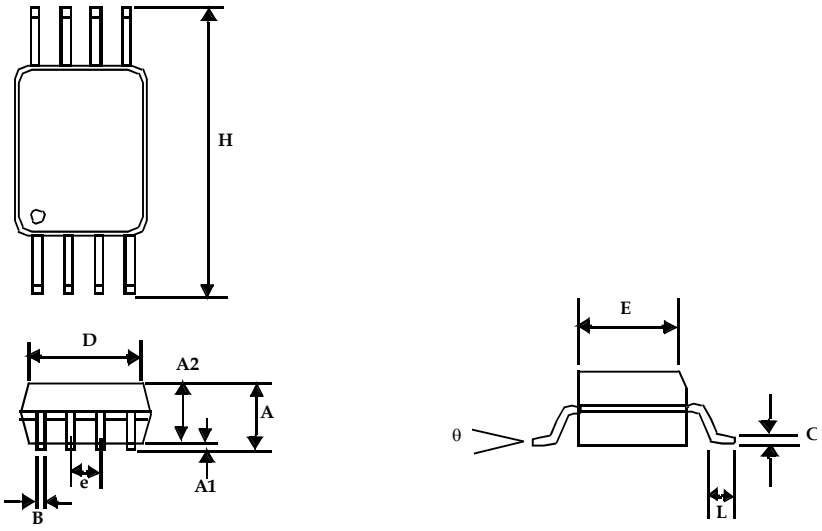
Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.04		1.00
A1	0.00	0.004	0.00	0.10
A2	0.033	0.036	0.84	0.90
b	0.012	0.02	0.30	0.50
H	0.005 BSC		0.127 BSC	
D	0.114 BSC		2.90 BSC	
B	0.06 BSC		1.60 BSC	
e	0.0374 BSC		0.950 BSC	
C	0.11 BSC		2.80 BSC	
L	0.0118	0.02	0.30	0.50
θ	0°	4°	0°	4°

8-Pin SOIC Package



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A1	0.004	0.010	0.10	0.25
A	0.053	0.069	1.35	1.75
A2	0.049	0.059	1.25	1.50
B	0.012	0.020	0.31	0.51
C	0.007	0.010	0.18	0.25
D	0.193 BSC		4.90 BSC	
E	0.154 BSC		3.91 BSC	
e	0.050 BSC		1.27 BSC	
H	0.236 BSC		6.00 BSC	
L	0.016	0.050	0.41	1.27
θ	0°	8°	0°	8°

8-Pin TSSOP Package

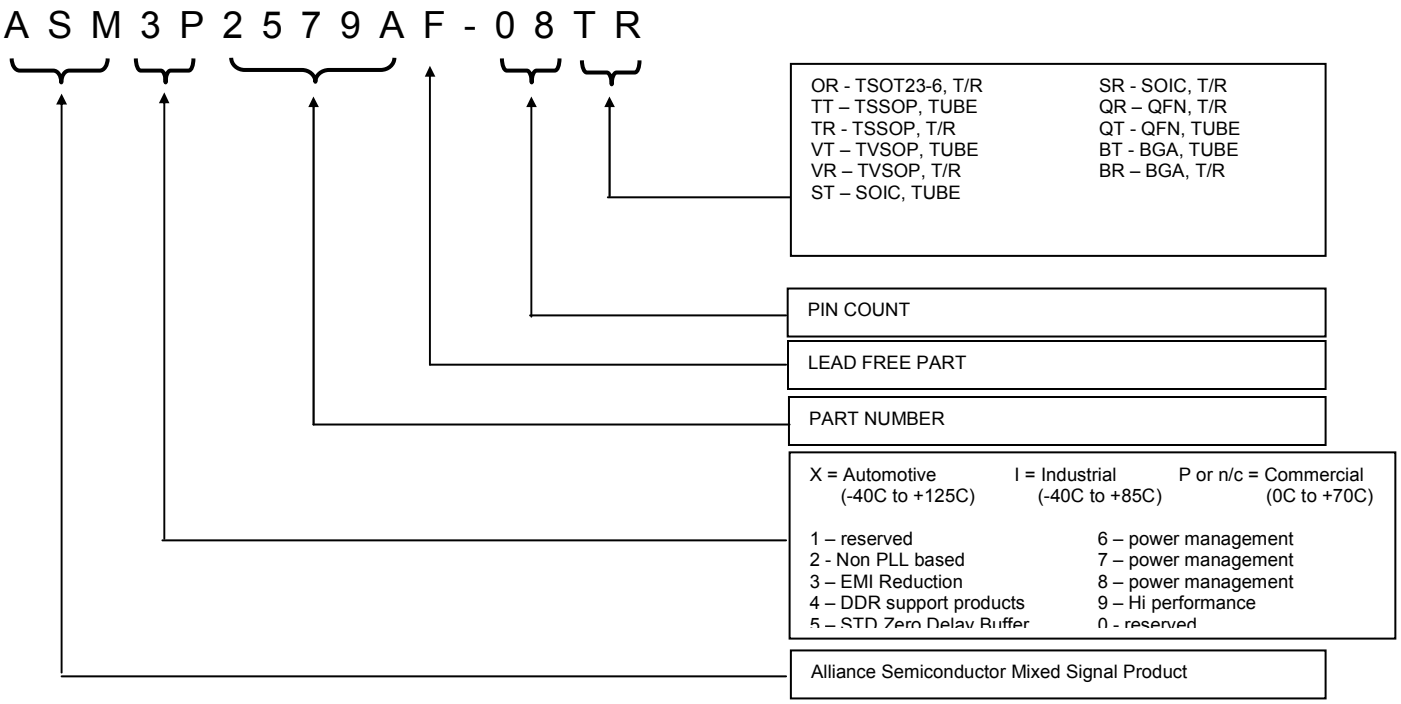


Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A		0.043		1.10
A1	0.002	0.006	0.05	0.15
A2	0.033	0.037	0.85	0.95
B	0.008	0.012	0.19	0.30
c	0.004	0.008	0.09	0.20
D	0.114	0.122	2.90	3.10
E	0.169	0.177	4.30	4.50
e	0.026 BSC		0.65 BSC	
H	0.252 BSC		6.40 BSC	
L	0.020	0.028	0.50	0.70
θ	0°	8°	0°	8°

Ordering Information

Part Number	Marking	Package Type	Temperature
ASM3P2579AF-06OR	S4LL	6-Pin TSOT-23, TAPE & REEL	Commercial
ASM3P2579AF-08TT	ASM3P2579AFT	8-Pin TSSOP, TUBE	Commercial
ASM3P2579AF-08TR	ASM3P2579AFT	8-Pin TSSOP, TAPE & REEL	Commercial
ASM3P2579AF-08ST	ASM3P2579AFS	8-Pin SOIC, TUBE	Commercial
ASM3P2579AF-08SR	ASM3P2579AFS	8-Pin SOIC, TAPE & REEL	Commercial
ASM3P2579A-06OR	S1LL	6-Pin TSOT-23, TAPE & REEL	Commercial
ASM3P2579A-08TT	ASM3P2579AT	8-Pin TSSOP, TUBE	Commercial
ASM3P2579A-08TR	ASM3P2579AT	8-Pin TSSOP, TAPE & REEL	Commercial
ASM3P2579A-08ST	ASM3P2579AS	8-Pin SOIC, TUBE	Commercial
ASM3P2579A-08SR	ASM3P2579AS	8-Pin SOIC, TAPE & REEL	Commercial

Device Ordering Information



Alliance Semiconductor Corporation
2595, Augustine Drive,
Santa Clara, CA 95054
Tel# 408-855-4900
Fax: 408-855-4999
www.alsc.com

Preliminary Information
Part Number: ASM3P2579A
Document Version: v0.3

Note: This product utilizes US Patent # 6,646,463 Impedance Emulator Patent issued to Alliance Semiconductor, dated 11-11-2003