Proposed Draft **Serial ATA International Organization**

Revision 02
05/01/2013

TPR050v2_SATA31_SATA_MicroSSD_Footprint_Update
Title : SATA MicroSSD Footprint Update

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Document History

Version	Date	Comments
00	2/26/2013	Initial release.
01	3/20/2013	Member review
02	05/01/2013	Ratified

1 Introduction

SanDisk added some new packages for MicroSSD-based products. The functional pins are identical to the other members of the package family. This TPR adds the new footprint and its ball-out to the the Serial ATA specification.

2 Technical Specification Changes

The following additions are based on the content of Serial ATA TP #035, SATA-BGA-SSD, Revision 12a, 06/01/2011. Deletions to TP 038 are marked in ~~red strike through~~; additions are marked in blue underline. Black is original content.

6.7 ~~BGA~~ SATA MicroSSD Interface (to be inserted before existing Section 6.7)

6.7.1 SATA MicroSSD Interface scope

This section defines the mechanical properties of the ~~a BGA~~ SATA MicroSSD device and device interface.

6.7.2 ~~BGA~~ SATA MicroSSD Mechanical Specification

A ~~BGA~~ SATA MicroSSD shall use package variants:

a) AC~~,~~;
b) AM~~,~~;
c) AK~~,~~;
d) AL~~,~~;
e) AR;
f) CA~~,~~; ~~or~~
g) CB~~,~~;
h) DB, or
i) DC,

as defined in the JEDEC document “MO-276, Standard Profile and Low Profile Rectangular Fine Pitch~~”,~~ Ball Grid Array Family, 0.50 mm Pitch”, revision E or later.

The rest of this section is informative only; refer to JEDEC MO-276E (or later) for the formal mechanical specification of ~~BGA~~ SATA MicroSSD packages.

The specified package variants for a ~~BGA~~ SATA MicroSSD use ~~four~~five distrinct package footprints. The package footprints (bottom view) are shown below. A “+” sign denotes a depopulated ball position. The functional balls (signals or power) for each footprint are the inner 3 or 4 rows on each footprint (square rows); the rest of the populated balls are mechanical only, for package stability. The normative signal assignment for the functional balls is specified in ~~Section~~ 6.6.2, ~~BGA~~ SATA MicroSSD Ballout.

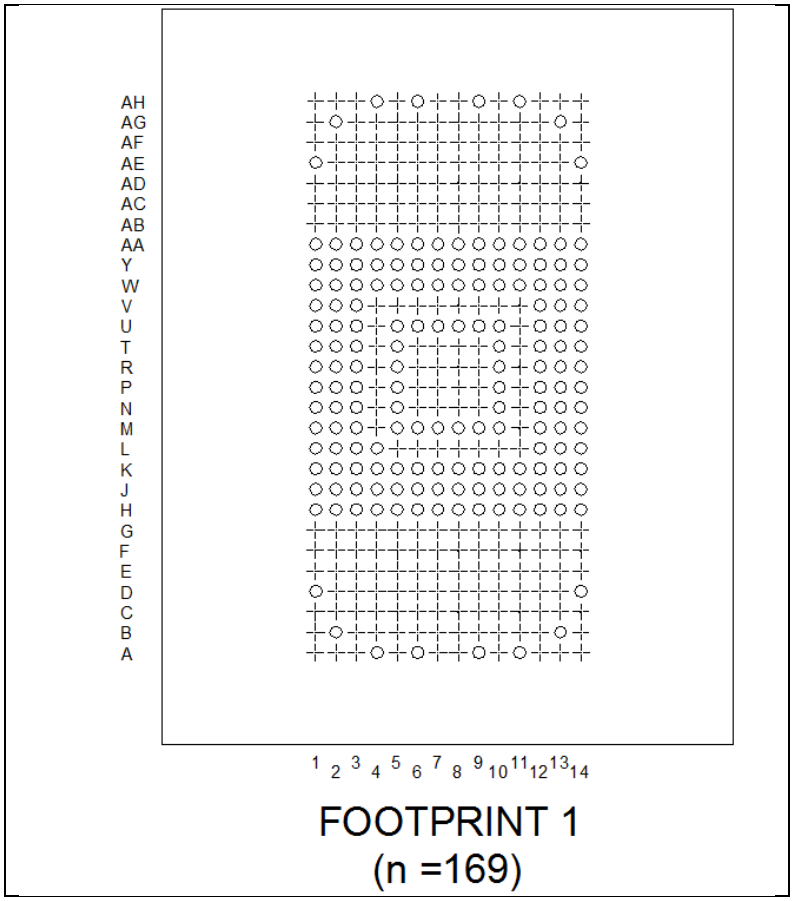

Figure 105 – Footprint 1, SATA MicroSSD variant AC, 169 balls (informative)

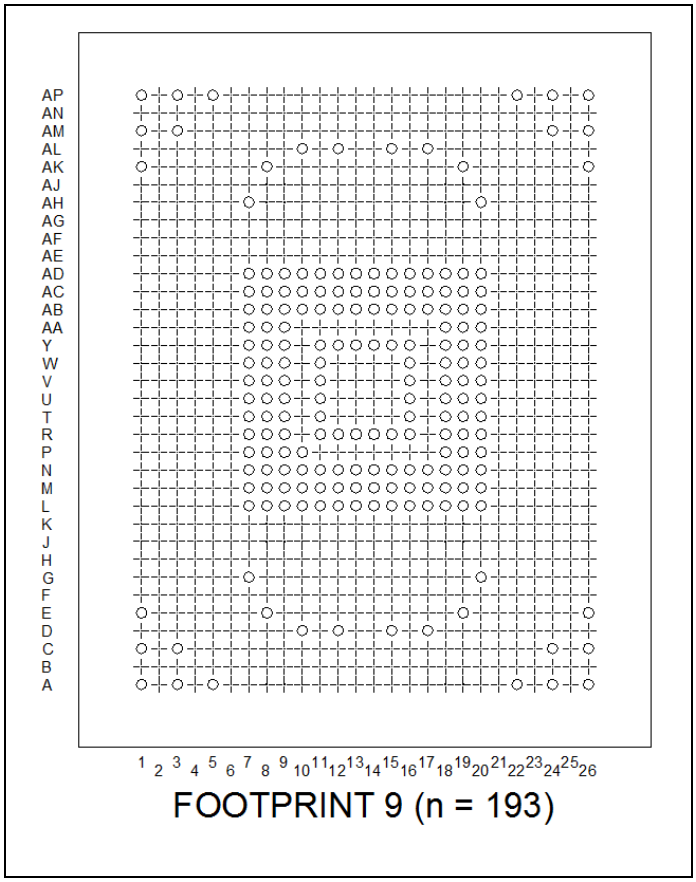

Figure 106 – Footprint 9, SATA MicroSSD variant AK and CB, 193 balls (informative)

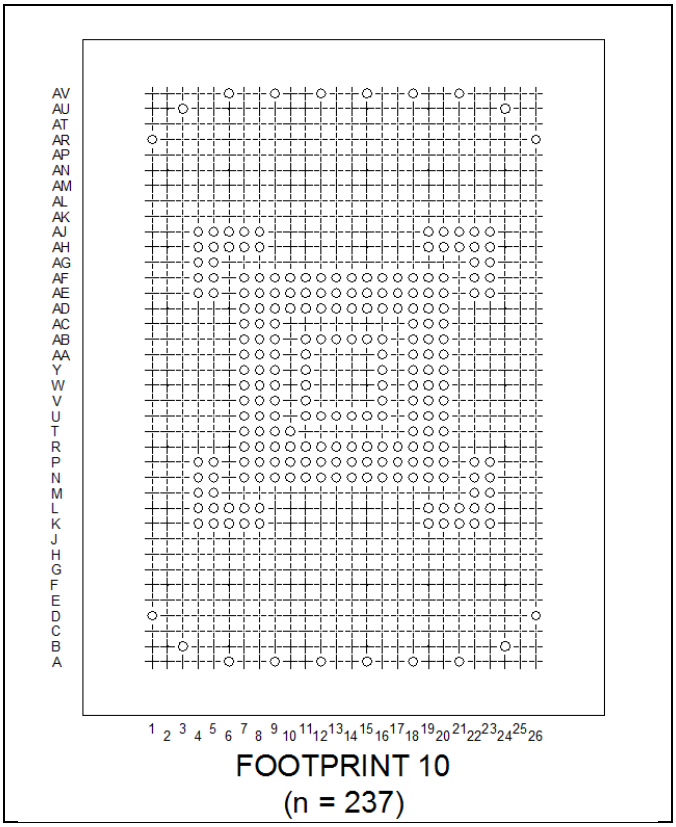

Figure 107 – Footprint 10, SATA MicroSSD variant AL, 237 balls (informative)

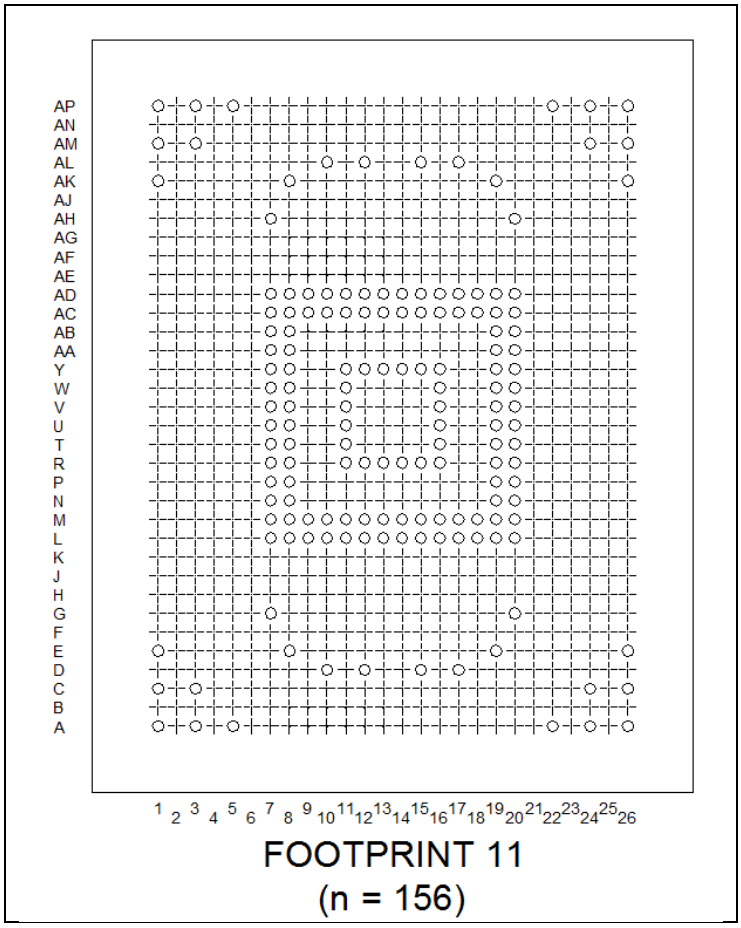

Figure 108 – Footprint 11, SATA MicroSSD variant AM and CA, 156 balls (informative)

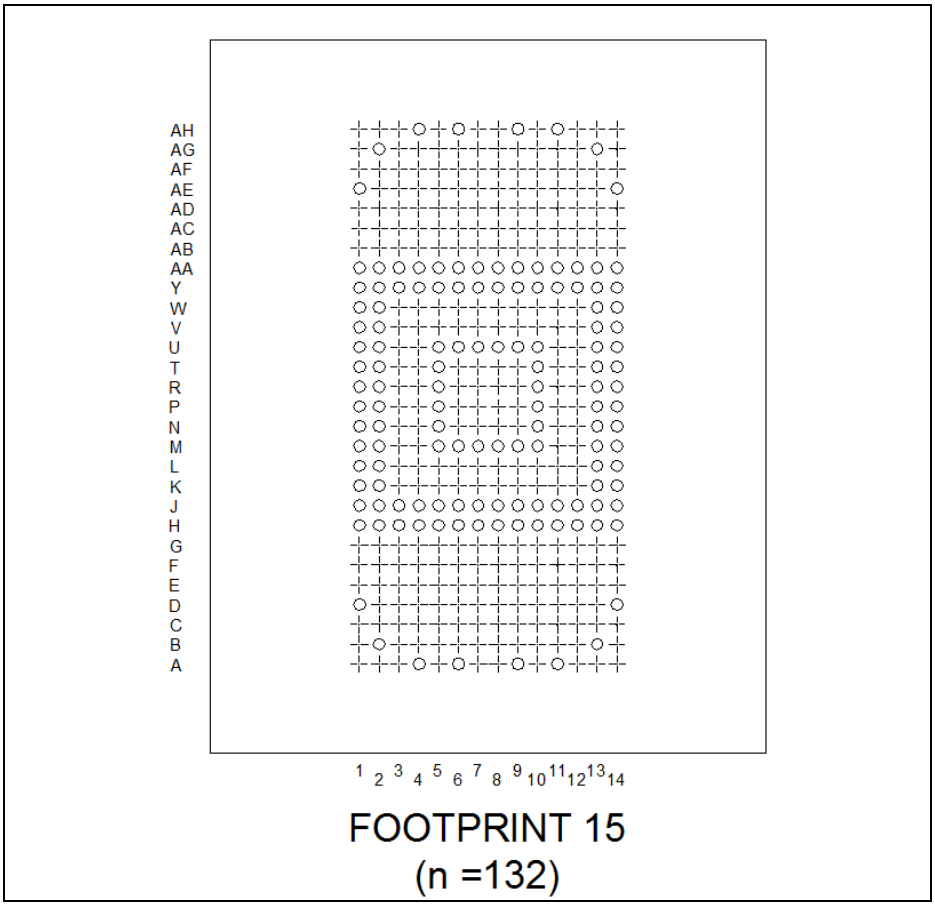

Figure 109 – Footprint 15, SATA MicroSSD variant AR, DB, and DC, 132 balls (informative)

6.7.3 ~~BGA~~ MicroSSD Ballout - Functional Signal Definition

Table x defines the signal assignment of the BGA SSD connection for each of the package types defined in Section 6.6.1.

- VSP - Vendor Specific
- RESERVED - Reserved for future standardization (SATA V3.1, Section 4.2.2.8)
- DNU (Do Not Use) - Internal test only; shall not be connected on host.
- TEST - May be connected for test/diagnostic use, but not used during normal device operation.

Table 22 - Signal Assignments for BGA SSD Device (part 1 of 5)

BALL ASSIGNMENT # Balls (Footprint #)					BALL NAME	TYPE	DESCRIPTIONS
132 (15)	156 (11)	169 (1)	193 (9)	237 (10)			
	SATA Interface Signals						
M1	R7	M1	R7	U7	SATA_RX_N	Input	Differential Signal Pair A (SATA Device Receive Signal Differential Pair)
L1	P7	L1	P7	T7	SATA_RX_P		
P1	U7	P1	U7	W7	SATA_TX_N	Output	Differential Signal Pair B (SATA Device Transmit Signal Differential Pair)
R1	V7	R1	V7	Y7	SATA_TX_P		

BALL ASSIGNMENT # Balls (Footprint #)					BALL NAME	TYPE	DESCRIPTIONS
132 (15)	156 (11)	169 (1)	193 (9)	237 (10)			
J7	M13	J7	M13	P13	DAS	Output	Device Activity Signal
P2	U8	P2	U8	W8	SATA_VCC	Supply	+3.3 V
R2	V8	R2	V8	Y8	SATA_VCC	Supply	+3.3 V
L2	P8	L2	P8	T8	SATA_VDD	Supply	+1.2 V
M2	R8	M2	R8	U8	SATA_VDD	Supply	+1.2 V
K1	N7	K1	N7	R7	SATA_VSS	GND	Signal Ground
N1	T7	N1	T7	V7	SATA_VSS	GND	Signal Ground
T1	W7	T1	W7	AA7	SATA_VSS	GND	Signal Ground
	Control Signals						
H3	L9	H3	L9	N9	XTAL_OUT	Output	System Clock output~~1~~a
J4	M10	J4	M10	P10	XTAL_IN	Input	System Clock input~~2~~b
J3	*M9*	*J3*	*M9*	*P9*	*PWR_RESETN*	*Input*	Hardware Reset~~3~~c
	Optional Signals						
AA10	AD16	AA10	AD16	AF16	SPI_MISO	Input	Master In Slave Out
AA9	AD15	AA9	AD15	AF15	SPI_CS0	Output	Chip Select
Y10	AC16	Y10	AC16	AE16	SPI_CLK	Output	Clock
AA12	AD18	AA12	AD18	AF18	SPI_CS1	Output	Chip Select
AA11	AD17	AA11	AD17	AF17	SPI_MOSI	Ouput	Master Out Slave In
V2	AA8	V2	AA8	AC8	TEST		
H9	L15	H9	L15	N15	TEST		
H10	L16	H10	L16	N16	TEST		
H11	L17	H11	L17	N17	TEST		
H12	L18	H12	L18	N18	TEST		
V14	AA20	V14	AA20	AC20	VSP		
J6	M12	J6	M12	P12	VSP		
Y3	AC9	Y3	AC9	AE9	~~RESERVED~~DEVSLP		~~Future Low Power (PHYSLP)~~Enter/Exit DevSleep
Y5	AC11	Y5	AC11	AE11	RESERVED		Future Low Power
H7	L13	H7	L13	N13	RESERVED		Future Low Power
	Power Supply Signals						
M7	R13	M7	R13	U13	VCC	Supply	+3.3 V
M8	R14	M8	R14	U14	VCC	Supply	+3.3 V
M9	R15	M9	R15	U15	VCC	Supply	+3.3 V
M10	R16	M10	R16	U16	VCC	Supply	+3.3 V
N10	T16	N10	T16	V16	VCC	Supply	+3.3 V
P10	U16	P10	U16	W16	VCC	Supply	+3.3 V

BALL ASSIGNMENT # Balls (Footprint #)					BALL NAME	TYPE	DESCRIPTIONS
132 (15)	156 (11)	169 (1)	193 (9)	237 (10)			
J5	M11	J5	M11	P11	VCC	Supply	+3.3 V
H6	L12	H6	L12	N12	VCC	Supply	+3.3 V
M13	R19	M13	R19	U19	VCC	Supply	+3.3 V
M14	R20	M14	R20	U20	VCC	Supply	+3.3 V
R5	V11	R5	V11	Y11	VCC	Supply	+3.3 V
U14	Y20	U14	Y20	AB20	VCC	Supply	+3.3 V
U13	Y19	U13	Y19	AB19	VCC	Supply	+3.3 V
V13	AA19	V13	AA19	AC19	VCC	Supply	+3.3 V
Y2	AC8	Y2	AC8	AE8	VCC	Supply	+3.3 V
R10	V16	R10	V16	Y16	VCCQ	Supply	+1.8 V
T10	W16	T10	W16	AA16	VCCQ	Supply	+1.8 V
U10	Y16	U10	Y16	AB16	VCCQ	Supply	+1.8 V
T5	W11	T5	W11	AA11	VDDC	Supply	+1.2 V
U5	Y11	U5	Y11	AB11	VDDC	Supply	+1.2 V
U6	Y12	U6	Y12	AB12	VDDC	Supply	+1.2 V
U7	Y13	U7	Y13	AB13	VDDC	Supply	+1.2 V
M5	R11	M5	R11	U11	VDD	Supply	+1.2 V
N5	T11	N5	T11	V11	VDD	Supply	+1.2 V
	GND signals						
M6	R12	M6	R12	U12	VSS	GND	Ground
P5	U11	P5	U11	W11	VSS	GND	Ground
H1	L7	H1	L7	N7	VSS	GND	Ground
H2	L8	H2	L8	N8	VSS	GND	Ground
J1	M7	J1	M7	P7	VSS	GND	Ground
H5	L11	H5	L11	N11	VSS	GND	Ground
H13	L19	H13	L19	N19	VSS	GND	Ground
H14	L20	H14	L20	N20	VSS	GND	Ground
J13	M19	J13	M19	P19	VSS	GND	Ground
J14	M20	J14	M20	P20	VSS	GND	Ground
K13	N19	K13	N19	R19	VSS	GND	Ground
L13	P19	L13	P19	T19	VSS	GND	Ground
Y14	AC20	Y14	AC20	AE20	VSS	GND	Ground
AA14	AD20	AA14	AD20	AF20	VSS	GND	Ground
AA13	AD19	AA13	AD19	AF19	VSS	GND	Ground
AA2	AD8	AA2	AD8	AF8	VSS	GND	Ground

BALL ASSIGNMENT # Balls (Footprint #)					BALL NAME	TYPE	DESCRIPTIONS
132 (15)	156 (11)	169 (1)	193 (9)	237 (10)			
AA1	AD7	AA1	AD7	AF7	VSS	GND	Ground
N2	T8	N2	T8	V8	VSS	GND	Ground
U8	Y14	U8	Y14	AB14	VSS	GND	Ground
U9	Y15	U9	Y15	AB15	VSS	GND	Ground
P13	U19	P13	U19	W19	VSS	GND	Ground
L14	P20	L14	P20	T20	VSS	GND	Ground
P14	U20	P14	U20	W20	VSS	GND	Ground
R13	V19	R13	V19	Y19	VSS	GND	Ground
Y1	AC7	Y1	AC7	AE7	VSS	GND	Ground
W1	AB7	W1	AB7	AD7	VSS	GND	Ground
K2	N8	K2	N8	R8	VSS	GND	Ground
	Other Signals						
AA5	AD11	AA5	AD11	AF11	DNU		
AA3	AD9	AA3	AD9	AF9	DNU		
Y7	AC13	Y7	AC13	AE13	DNU		
AA7	AD13	AA7	AD13	AF13	DNU		
Y8	AC14	Y8	AC14	AE14	DNU		
J10	M16	J10	M16	P16	DNU		
J8	M14	J8	M14	P14	RESERVED		
J2	M8	J2	M8	P8	RESERVED		
H4	L10	H4	L10	N10	RESERVED		
H8	L14	H8	L14	N14	RESERVED		
N13	T19	N13	T19	V19	RESERVED		
R14	V20	R14	V20	Y20	RESERVED		
N14	T20	N14	T20	V20	RESERVED		
K14	N20	K14	N20	R20	RESERVED		
J11	M17	J11	M17	P17	RESERVED		
J12	M18	J12	M18	P18	RESERVED		
W2	AB8	W2	AB8	AD8	RESERVED		
W13	AB19	W13	AB19	AD19	RESERVED		
W14	AB20	W14	AB20	AD20	RESERVED		
Y11	AC17	Y11	AC17	AE17	RESERVED		
AA8	AD14	AA8	AD14	AF14	RESERVED		
Y9	AC15	Y9	AC15	AE15	RESERVED		
AA6	AD12	AA6	AD12	AF12	RESERVED		

BALL ASSIGNMENT # Balls (Footprint #)					BALL NAME	TYPE	DESCRIPTIONS
132 (15)	156 (11)	169 (1)	193 (9)	237 (10)			
Y13	AC19	Y13	AC19	AE19	RESERVED		
Y12	AC18	Y12	AC18	AE18	RESERVED		
T14	W20	T14	W20	AA20	RESERVED		
T13	W19	T13	W19	AA19	RESERVED		
V1	AA7	V1	AA7	AC7	RESERVED		
U1	Y7	U1	Y7	AB7	RESERVED		
T2	W8	T2	W8	AA8	RESERVED		
U2	Y8	U2	Y8	AB8	RESERVED		
AA4	AD10	AA4	AD10	AF10	RESERVED		
Y6	AC12	Y6	AC12	AE12	RESERVED		
J9	M15	J9	M15	P15	RESERVED		
Y4	AC10	Y4	AC10	AE10	RESERVED		
		K3	N9	R9	RESERVED		
		L3	P9	T9	RESERVED		
		M3	R9	U9	RESERVED		
		N3	T9	V9	RESERVED		
		P3	U9	W9	RESERVED		
		R3	V9	Y9	RESERVED		
		T3	W9	AA9	RESERVED		
		U3	Y9	AB9	RESERVED		
		V3	AA9	AC9	RESERVED		
		W3	AB9	AD9	RESERVED		
		K12	N18	R18	RESERVED		
		L12	P18	T18	RESERVED		
		M12	R18	U18	RESERVED		
		N12	T18	V18	RESERVED		
		P12	U18	W18	RESERVED		
		R12	V18	Y18	RESERVED		
		T12	W18	AA18	RESERVED		
		U12	Y18	AB18	RESERVED		
		V12	AA18	AC18	RESERVED		
		W12	AB18	AD18	RESERVED		
		K4	N10	R10	RESERVED		
		K5	N11	R11	RESERVED		
		K6	N12	R12	RESERVED		

BALL ASSIGNMENT # Balls (Footprint #)					BALL NAME	TYPE	DESCRIPTIONS
132 (15)	156 (11)	169 (1)	193 (9)	237 (10)			
		K7	N13	R13	RESERVED		
		K8	N14	R14	RESERVED		
		K9	N15	R15	RESERVED		
		K10	N16	R16	RESERVED		
		K11	N17	R17	RESERVED		
		W4	AB10	AD10	RESERVED		
		W5	AB11	AD11	RESERVED		
		W6	AB12	AD12	RESERVED		
		W7	AB13	AD13	RESERVED		
		W8	AB14	AD14	RESERVED		
		W9	AB15	AD15	RESERVED		
		W10	AB16	AD16	RESERVED		
		W11	AB17	AD17	RESERVED		
		L4	P10	T10	RESERVED		

~~Notes:~~

[a] Optional pin reserved for system clock output to drive crystal or other system requirements. Frequency is system implementation dependent.

[b] Optional pin reserved for system clock input. Frequency is system implementation dependent.

[c] Optional pin reserved for Hardware Reset. Implementation is system dependent. For detailed timing information, consult device data sheet.