

PCMCIA / JEIDA SRAM Card Product Specification

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Pretec/C-ONE Technology Corp.

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1. Features

PCMCIA / JEIDA standard	Rechargeable battery design with Double or Quad power for longer battery life
1M bytes ~ 16M bytes memory capacity	Battery capacity: 25mAh ~ 130mAh
Byte (x8) / word (x16) data bus selectable	Connector type : 68 pins with 2 rows
Fast access time : 120ns (maximum)	Credit card size Type I : 54.0 x 85.6 x 3.3 (mm)
Wide range Vcc operation (5V/3.3V)	Credit card size Type II : 54.0 x 85.6 x 5 (mm)
Ruggedized metal construction for extreme environmental protection	Extended temperature or Industrial temperature range available
Hardware write protect switch in plastic housing for freedom of choice, or water-resistant metal housing without hardware write protect switch for outermost ruggedness	Attribute memory : 8 KB (optional 2KB/0KB by special request)

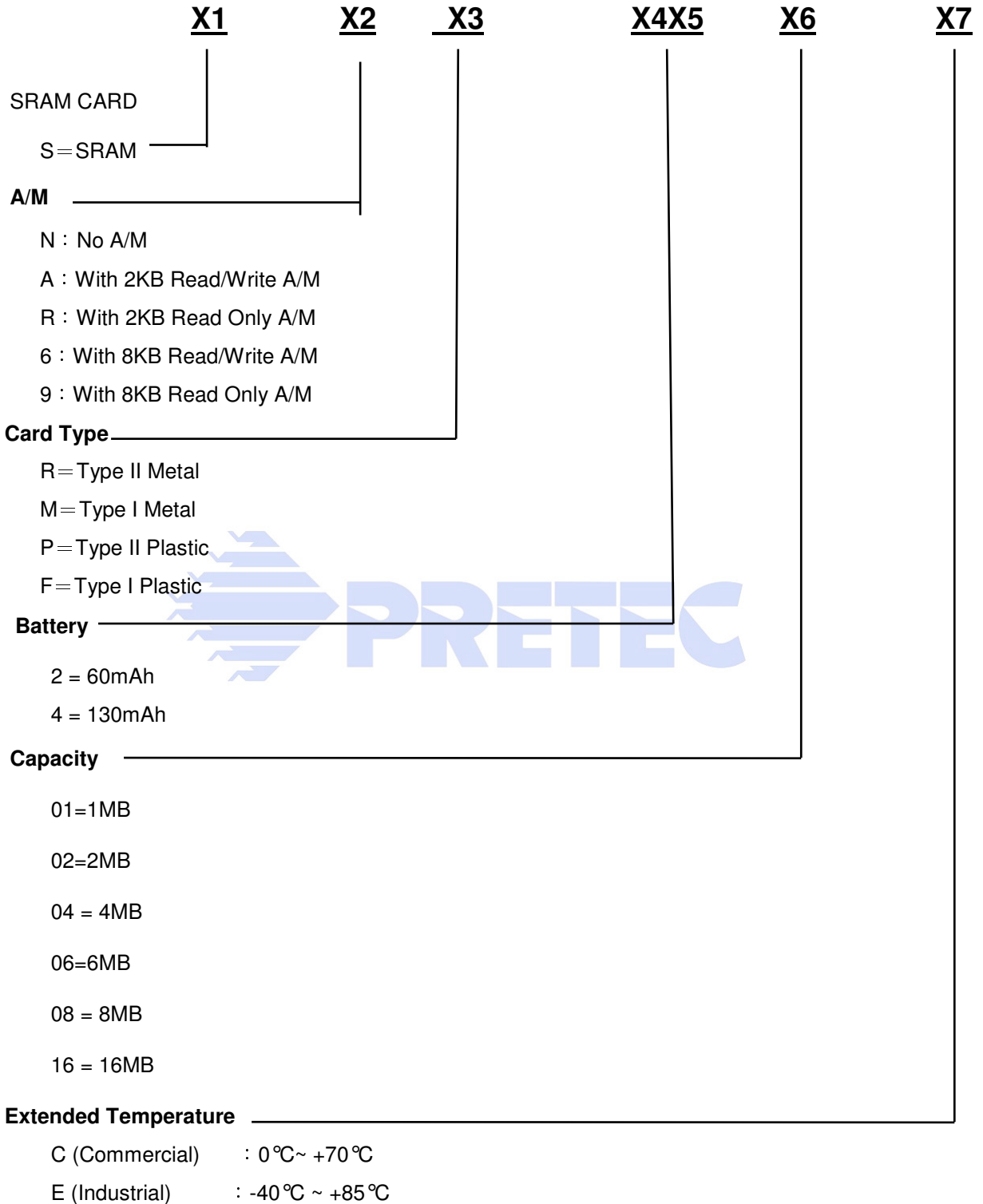
2. General Description

PRETEC/C-ONE offers a high performance PCMCIA / JEIDA international standard SRAM with extended battery capacity and low power consumption.

With the high capacity of rechargeable battery design, C-ONE SRAM card is able to have better data retention for double or quad power than usual.

Flexible design for optional 8K, 2K or 0K bytes attribute memory; ruggedized metal construction for extreme environmental protection, or hardware write protect switch in plastic housing for freedom of choice or water-resistant metal housing without hardware write protect switch for outermost ruggedness.

3. Product Number Definition



Note : A/M mean is attribute memory product list

3.1 Commercial Grade (0 °C~+70 °C), 8KB A/M.60mAh Battery

Part NO.	Capacity	Description
S6F201C	1MB	SRAM 1MB Plastic Type I 0 °C ~70 °C
S6F202C	2MB	SRAM 2MB Plastic Type I 0 °C ~70 °C
S6F204C	4MB	SRAM 4MB Plastic Type I 0 °C ~70 °C
S6F206C	6MB	SRAM 4MB Plastic Type I 0 °C ~70 °C
S6F208C	8MB	SRAM 8MB Plastic Type I 0 °C ~70 °C
S6F216C	16MB	SRAM 16MB Plastic Type I 0 °C ~70 °C

3.2 Extended Grade (-40 °C~+85 °C), 8KB A/M, 60mAh Battery

Part NO.	Capacity	Description
S6M201E	4MB	SRAM 4MB Metal Type I -40 °C ~85 °C
S6M202E	8MB	SRAM 8MB Metal Type I -40 °C ~85 °C
S6M204E	16MB	SRAM 16MB Metal Type I -40 °C ~85 °C
S6M206E	4MB	SRAM 4MB Plastic Type I -40 °C ~85 °C
S6M208E	8MB	SRAM 8MB Plastic Type I -40 °C ~85 °C
S6M216E	16MB	SRAM 16MB Plastic Type I -40 °C ~85 °C

3.3 Commercial Grade (0 °C~+70 °C), 8KB A/M.130mAh Battery

Part NO.	Capacity	Description
S6P401C	1MB	SRAM 1MB Metal Type II 0 °C ~70 °C
S6P402C	2MB	SRAM 2MB Metal Type II 0 °C ~70 °C
S6P404C	4MB	SRAM 4MB Metal Type II 0 °C ~70 °C
S6P406C	6MB	SRAM 4MB Metal Type II 0 °C ~70 °C
S6P408C	8MB	SRAM 8MB Metal Type II 0 °C ~70 °C
S6P416C	16MB	SRAM 16MB Metal Type II 0 °C ~70 °C

3.4 Extended Grade (-40°C~+85°C), 8KB A/M, 130mAh Battery

Part NO.	Capacity	Description
S6R401E	4MB	SRAM 4MB Metal Type II -40°C ~85°C
S6R402E	8MB	SRAM 8MB Metal Type II -40°C ~85°C
S6R404E	16MB	SRAM 16MB Metal Type II -40°C ~85°C
S6R406E	4MB	SRAM 4MB Plastic Type II -40°C ~85°C
S6R408E	8MB	SRAM 8MB Plastic Type II -40°C ~85°C
S6R416E	16MB	SRAM 16MB Plastic Type II -40°C ~85°C

3.5 Pin Configuration

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Pin No.	
BUSY*	WE*	A14	A13	A8	A9	A11	OE*	A10	CE1	D7	D6	D5	D4	D3	GND	Pin Name	
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	Pin No.	
D2	D1	D0	A0	A1	A2	A3	A4	A5	A6	A7	A12	A15	A16	NC	VCC	Pin Name	
48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	Pin No.	
A19	A18	A17	NC	NC	NC	CE2	D15	D14	D13	D12	D11	CD*	GN D	GND	WP	Pin Name	
64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	Pin No.	
D8	BV D1	BV D2	RE G	NC	NC	NC	NC	NC	NC	A23	A22	NC	VC C	A21	A20	Pin Name	
													68	67	66	65	Pin No.
													GN D	CD 2	D10	D9	Pin Name

Note : * mean low active

3.6 Pin Description

Symbol	Function	I/O
A0 - A23	Addresses	I
D0 - D15	Data Inputs/Outputs	I/O
CE1*/CE2*	Card Enable	I
OE*	Output Enable	I
WE*	Write Enable	I
REG*	Attribute Memory Enable	I
WP	Write-protect Detect	O
BVD1*/BVD2*	Battery Voltage Detect	O
BUSY*	Busy Output (Open drain)	O
CD1*/CD2*	Card Detect (tied to GND internally)	O
VCC	+5 Volt Power Supply (3.3V optional)	-
GND	Ground	-
NC	No Connection	-

3.7 Pin Location

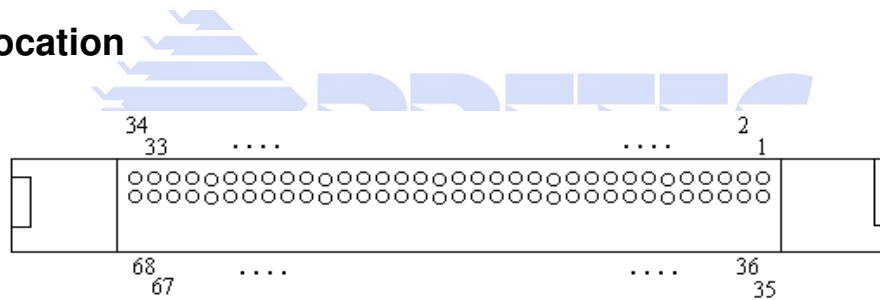


Figure 1 Bottom View (Connector Side)

3.8 Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	VCC	3/4.5	3.6/5.5	V
Input High Voltage	V _{IH}	0.7VCC	VCC + 0.3	V
Input Low Voltage	V _{IL}	- 0.3	0.8	V
Battery Voltage	VBAT	2.37		V
Operating Temperature (Commercial)	T _{OPR}	0	60	°C
Operating Temperature (Industrial)	T _{OPR}	-40	85	°C
Relative Humidity (non-condensing)	HUM		95	%

3.9 Comments

Stress above those listed under “Absolute Maximum Ratings “ may cause permanent damage to the products. These are stress rating only. Functional operation of these products at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect product reliability.



4. Function Table (Write is NOT protected)

Function	REG*	CE2*	CE1*	A0	OE*	WE*	WP	D15 - D8	D7 - D0
Read C/M (x8)	H	H	L	L	L	H	L	High - Z	Even Byte Data Out
Read C/M (x8)	H	H	L	H	L	H	L	High - Z	Odd Byte Data Out
Read C/M (x8)	H	L	H	X	L	H	L	Odd Byte Data Out	High - Z
Read C/M (x16)	H	L	L	X	L	H	L	Odd Byte Data Out	Even Byte Data Out
Write C/M (x8)	H	H	L	L	H	L	L	X	Even Byte Data In
Write C/M (x8)	H	H	L	H	H	L	L	X	Odd Byte Data In
Write C/M (x8)	H	L	H	X	H	L	L	Odd Byte Data In	X
Write C/M (x16)	H	L	L	X	H	L	L	Odd Byte Data In	Even Byte Data In
Standby	X	H	H	X	X	X	L	High - Z	High - Z
Output Disable	X	X	X	X	H	H	L	High - Z	High - Z
Read A/M (x8)	L	H	L	L	L	H	L	High - Z	Even Byte Data Out
Read A/M (x8)	L	H	L	H	L	H	L	High - Z	Data Out (invalid)
Read A/M (x8)	L	L	H	X	L	H	L	Data Out (invalid)	High - Z
Read A/M (x16)	L	L	L	X	L	H	L	Data Out (invalid)	Even Byte Data Out
Write A/M (x8)	L	H	L	L	H	L	L	X	Even Byte Data In
Write A/M (x8)	L	H	L	H	H	L	L	X	X
Write A/M (x8)	L	L	H	X	H	L	L	X	X
Write A/M (x16)	L	L	L	X	H	L	L	X	Even Byte Data In

4.1 Function Table (Write is protected)

Function	REG*	CE2*	CE1*	A0	OE*	WE*	WP	D15 - D8	D7 - D0
Read C/M (x8)	H	H	L	L	L	H	H	High - Z	Even Byte Data Out
Read C/M (x8)	H	H	L	H	L	H	H	High - Z	Odd Byte Data Out
Read C/M (x8)	H	L	H	X	L	H	H	Odd Byte Data Out	High - Z
Read C/M (x16)	H	L	L	X	L	H	H	Odd Byte Data Out	Even Byte Data Out
Write C/M (x8)	H	H	L	L	H	L	H	X	X
Write C/M (x8)	H	H	L	H	H	L	H	X	X
Write C/M (x8)	H	L	H	X	H	L	H	X	X
Write C/M (x16)	H	L	L	X	H	L	H	X	X
Standby	X	H	H	X	X	X	H	High - Z	High - Z
Output Disable	X	X	X	X	H	H	H	High - Z	High - Z

Read A/M (x8)	L	H	L	L	L	H	H	High - Z	Even Byte Data Out
Read A/M (x8)	L	H	L	H	L	H	H	High - Z	Data Out (invalid)
Read A/M (x8)	L	L	H	X	L	H	H	Data Out (invalid)	High - Z
Read A/M (x16)	L	L	L	X	L	H	H	Data Out (invalid)	Even Byte Data Out
Write A/M (x8)	L	H	L	L	H	L	H	X	X
Write A/M (x8)	L	H	L	H	H	L	H	X	X
Write A/M (x8)	L	L	H	X	H	L	H	X	X
Write A/M (x16)	L	L	L	X	H	L	H	X	X

Note :

Definition : C/M = Common Memory, A/M = Attribute Memory

L = V_{IL}; H = V_{IH}; X = don't care can be either V_{IH} or V_{IL}

4.2 Common Memory Address Configuration Using 8-bit Data Bus (CE2* = V_{IH}, CE1* = V_{IL})

A23 to A0	D15 -- D8	D7 -- D0
0000 0000 0000 0000 0000 0000	High - Z	Address 0
0000 0000 0000 0000 0000 0001	High - Z	Address 1
0000 0000 0000 0000 0000 0010	High - Z	Address 2
1111 1111 1111 1111 1111 1101	High - Z	Address 16777213
1111 1111 1111 1111 1111 1110	High - Z	Address 16777214
1111 1111 1111 1111 1111 1111	High - Z	Address 16777215

4.3 Common Memory Address Configuration Using 8-bit Data Bus (CE2* = V_{IL}, CE1* = V_{IH})

A23 to A0	D15 -- D8	D7 -- D0
0000 0000 0000 0000 0000 000X	Address 1	High - Z
0000 0000 0000 0000 0000 001X	Address 3	High - Z
0000 0000 0000 0000 0000 010X	Address 5	High - Z
1111 1111 1111 1111 1111 101X	Address 16777211	High - Z
1111 1111 1111 1111 1111 110X	Address 16777213	High - Z
1111 1111 1111 1111 1111 111X	Address 16777215	High - Z

4.4 Common Memory Address Configuration Using 16-bit Data Bus (CE2*=VIL,CE1*=VIL)

A23 to A0	D15 -- D8	D7 -- D0
0000 0000 0000 0000 0000 000X	Address 1	Address 0
0000 0000 0000 0000 0000 001X	Address 3	Address 2
0000 0000 0000 0000 0000 010X	Address 5	Address 4
1111 1111 1111 1111 1111 101X	Address 16777211	Address 16777210
1111 1111 1111 1111 1111 110X	Address 16777213	Address 16777212
1111 1111 1111 1111 1111 111X	Address 16777215	Address 16777214

Note :

The above tables are examples for 8M bytes /4M words SRAM cards.

Definition : L = VIL; H = VIH; X = don't care , can be either VIH or VIL.

4.5 Absolute Maximum Ratings

Operating Temperature (ambient)	
Commercial	0 °C to 70 °C
Industrial	-40 °C to 85 °C
Storage Temperature (ambient)	
Commercial	0 °C to 70 °C
Industrial	-40 °C to 85 °C
Power of Voltage	
Voltage on any pin relative to Vss	-0.5 to V _{CC} + 0.3 (6V max.)
Vcc supply Voltage relative to Vss	-0.5 to + 6.0V

4.6 DC Electrical Characteristic)

Symbol	Parameter	Min.	Max.	Unit	Test Conditions
ICC	Vcc Operating Current	<12mA	20	mA	Vcc=5.25V ,Icycle=150ns
ICCS	Vcc Standby Current	<5mA	10	mA	Vcc=5.25V ,Control Signals=Vcc
ILI	Input Leakage Current		±10	uA	Vcc-Vcc Max, Vin=Vcc or Vss
ILO	Output Leakage Current		±10	uA	Vcc-Vcc Max, Vin=Vcc or Vss
VOH	Output High Voltage	3.8		V	IOH = -2mA
VOL	Output Low Voltage		0.4	V	IOL = 3.2mA
VIH	Input High Voltage	0.7Vcc	Vcc+0.3	V	
VIL	Input Low Voltage	-0.3	0.3Vcc	V	

4.7 Battery Characteristics

Parameter	Density	Notes	Type I	Type II	Units	Condition
Battery Life	All	1	10		Years	Normal Operation, T=25 °C
Battery Backup Time	1 MB	2	42	82	Months	Battery backup time is a calculated value and is not guaranteed. This is should not be use to schedule battery recharging (Temp. 25°C)
	2 MB		42	82		
	4 MB		42	82		
	6 MB		42	82		
	8 MB		40	80		
	16 MB		40	80		

Notes:

1. Battery Life refer to functional lifetime of battery
2. Battery Backup time is density and temperature dependent

4.8 AC Electrical Characteristics (Common Memory)

(recommended operating conditions unless otherwise noted)

4.8.1 Read Cycle (Common Memory)

JEDEC PARAMETER NAME	PARAMETER NAME	DESCRIPTION	CYCLE TIME : 55ns (V _{CC} = 3.0~5.5V)			CYCLE TIME : 70ns (V _{CC} = 2.7~5.5V)			UNITS
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
t _{AVAX}	t _{RC}	Read Cycle Time	55	--	--	70	--	--	ns
t _{AVQX}	t _{AA}	Address Access Time	--	--	55	--	--	70	ns
t _{E1LQV}	t _{ACS1}	Chip Select Access Time (CE1)	--	--	55	--	--	70	ns
t _{E2HQV}	t _{ACS2}	Chip Select Access Time (CE2)	--	--	55	--	--	70	ns
t _{GLQV}	t _{OE}	Output Enable to Output Valid	--	--	25	--	--	30	ns
t _{E1LQX}	t _{CLZ1}	Chip Select to Output Low Z (CE1)	10	--	--	10	--	--	ns
t _{E2HQX}	t _{CLZ2}	Chip Select to Output Low Z (CE2)	10	--	--	10	--	--	ns
t _{GLQX}	t _{OLZ}	Output Enable to Output Low Z	10	--	--	10	--	--	ns
t _{E1HQZ}	t _{CHZ1}	Chip Select to Output High Z (CE1)	--	--	30	--	--	35	ns
t _{E2LOZ}	t _{CHZ2}	Chip Select to Output High Z (CE2)	--	--	30	--	--	35	ns
t _{GHQZ}	t _{OHZ}	Output Enable to Output High Z	--	--	25	--	--	30	ns
t _{AVQX}	t _{OH}	Data Hold from Address Change	10	--	--	10	--	--	ns

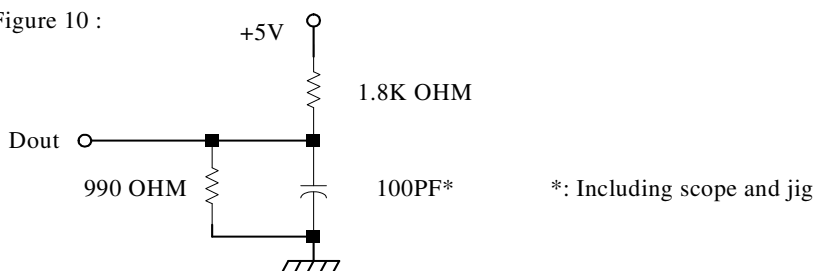
4.8.2 Write Cycle (Common Memory)

JEDEC PARAMETER NAME	PARAMETER NAME	DESCRIPTION	CYCLE TIME : 55ns (V _{CC} = 3.0~5.5V)			CYCLE TIME : 70ns (V _{CC} = 2.7~5.5V)			UNITS
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
t _{AVAX}	t _{WC}	Write Cycle Time	55	--	--	70	--	--	ns
t _{AVWL}	t _{AS}	Chip Select to End of Write	0	--	--	0	--	--	ns
t _{AVWH}	t _{AW}	Address Set up Time	40	--	--	50	--	--	ns
t _{E1LWH}	t _{CW}	Address Valid to End of Write	40	--	--	50	--	--	ns
t _{WLWH}	t _{WP}	Write Pulse Width	30	--	--	35	--	--	ns
t _{WHAX}	t _{WR1}	Write Recovery Time (CE1, WE)	0	--	--	0	--	--	ns
t _{E2LAX}	t _{WR2}	Write Recovery Time (CE2)	0	--	--	0	--	--	ns
t _{WLQZ}	t _{WHZ}	Write to Output High Z	--	--	25	--	--	30	ns
t _{DVWH}	t _{DW}	Data to Write Time Overlap	25	--	--	30	--	--	ns
t _{WHDX}	t _{DH}	Data Hold from Write Time	0	--	--	0	--	--	ns
t _{GHQZ}	t _{OHZ}	Output Disable to Output in High Z	--	--	25	--	--	30	ns
t _{WHQX}	t _{OW}	End of Write to Output Active	5	--	--	5	--	--	ns

4.9 AC Characteristics Test Conditions

Input Pulse Level	$V_{OH} = 0.7V_{CC}$, $V_{IL} = 0.8V$
Input Rise and Fall Time	5ns (max)
Timing Measurement Reference Level	$V_{IH} / V_{IL} = 2.4V / 0.6V$, $V_{OH} / V_{OL} = 2V / 0.8V$
Output Load	1TTL Gate + 100PF (Figure 9)

Figure 10 :



4.10 Input / Output Capacitance

($T_a = 25^{\circ}C$, $f = 1MHz$, $V_{in}/V_{out} = 0V$) , these parameters are sampled not 100% tested.

Symbol	Parameter	Min.	Max.	Unit
Cin	Input Capacitance		110	PF
Ci/o	I/O Capacitance		35	PF

4.11 Lithium Ion Battery

- Recharges at standby voltage
- Typical < 100 μ A for fully charged
- Maximum 10mA for fully discharged
- Backup battery average charge 6 months (lower densities have longer charge times, higher densities have shorter charge times)



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