

FEATURES

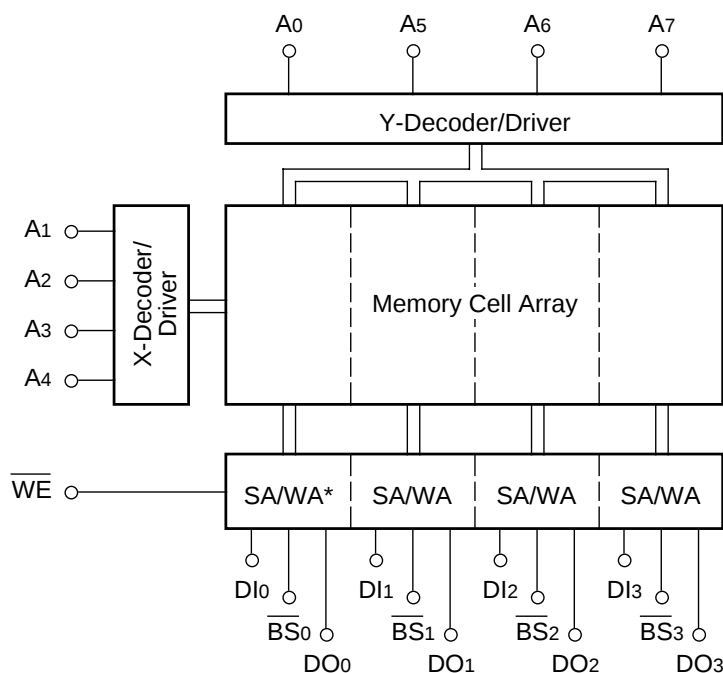
- Address access time, t_{AA} : 3/4/5/7ns max.
- Block select access time, t_{AB} : 2ns max.
- Write pulse width, t_{WW} : 3ns min.
- Edge rate, t_r/t_f : 500ps typ.
- Write recovery times under 5ns
- Power supply current, I_{EE} : -250mA, -200mA for -5/7ns
- Superior immunity against alpha particles provides virtually no soft error sensitivity
- Built with advanced ASSET™ technology
- Fully compatible with industry standard 10K/100K ECL I/O levels
- Noise margins improved with on-chip voltage and temperature compensation
- Open emitter output for easy memory expansion
- Includes popular Block Select function allowing individual read/write control over blocks
- ESD protection of 2000V
- Available in 24-pin flatpack and 28-pin PLCC and MLCC packages

DESCRIPTION

The Synergy SY10/100/101422 are 1024-bit Random Access Memories (RAMs), designed with advanced Emitter Coupled Logic (ECL) circuitry. The devices are organized as 256-words-by-4-bits and meet the standard 10K/100K family signal levels. The SY100422 is also supply voltage-compatible with 100K ECL, while the SY101422 operates from 10K ECL supply voltage (-5.2V). All feature on-chip voltage and temperature compensation for improved noise margin.

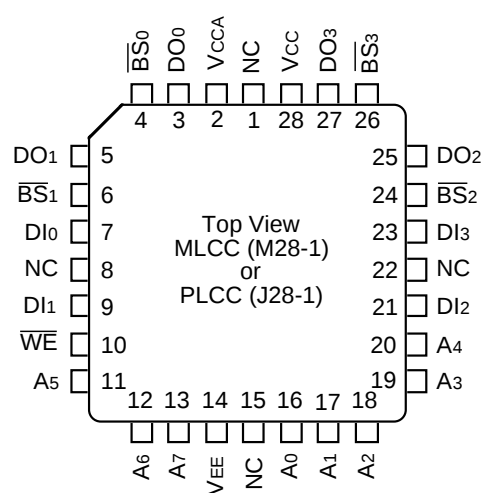
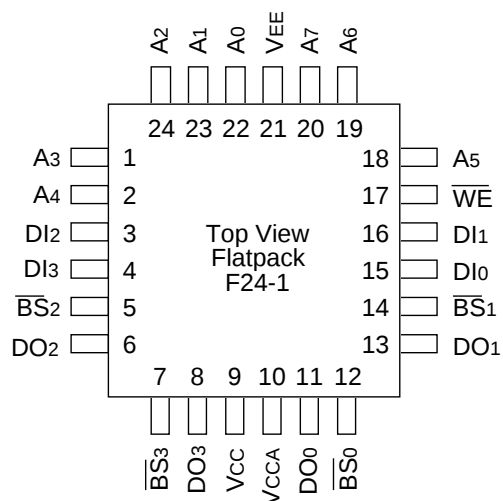
The SY10/100/101422 employ proprietary circuit design techniques and Synergy's proprietary ASSET advanced bipolar technology to achieve extremely fast access, write pulse width and write recovery times. ASSET uses proprietary technology concepts to achieve significant reduction in parasitic capacitance while improving device packing density. Synergy's circuit design techniques, coupled with ASSET, result not only in ultra-fast performance, but also allow device operation at reduced power levels with virtually no soft error sensitivity and with outstanding device reliability in volume production.

BLOCK DIAGRAM



* SA = Sense Amplifier
WA = Write Amplifier

PIN CONFIGURATIONS



PIN NAMES

Label	Function
A0 - A7	Address Inputs
$\overline{BS}_0$ - $\overline{BS}_3$	Block Select ($\overline{BS}$)
$\overline{WE}$	Write Enable
DI0 - DI3	Data Input (DIN)
DO0 - DO3	Data Output (DOUT)
VCC	GND (0V)
VCCA	Output GND (0V)
VEE	Supply Voltage

TRUTH TABLE

Input			Output	Mode
$\overline{BS}$	$\overline{WE}$	DIN		
H	X	X	L	Disabled
L	L	H	L	Write "H"
L	L	L	L	Write "L"
L	H	X	DOUT	Read

NOTE:

H = High Voltage Level

L = Low Voltage Level

X = Don't Care

FUNCTIONAL DESCRIPTION

The Synergy SY10/100/101422 are 1024-bit RAMs organized as four 256-by-1-bit blocks with each block having its own Block Select ($\overline{BS}$) control signal that functions essentially like a unique chip select for the Block. The four blocks and Block Selects together make the device a 256 x 4-bit RAM. Memory cell selection is achieved by using the 8 address bits designated as A0 through A7. Each of the 2^8 possible input address combinations corresponds to a unique word location in memory. The active low Block Select ($\overline{BS}$) control signals are provided for memory expansion and for independent control of each of the four 256 x 1-bit blocks of memory. The active low Write Enable ($\overline{WE}$) controls the read and write operation on the selected block or blocks. Data resident on the DIN inputs (D0 through D3) is written into the addressed location only when $\overline{WE}$ and the Block Select ($\overline{BS}$) associated with each of the DIN bits is held LOW. This allows control of the Write operation to any one,

two, three or all four of the input data bits. In order to perform a read operation, $\overline{WE}$ is held high, the Block Select ($\overline{BS}$) associated with each of the four output blocks is held low, and the non-inverted output data at the addressed location is transferred to DOUT (DO0 through DO3) to be read out. This allows control of the Read operation to any one, two, three or all four of the output blocks. Open emitter outputs are provided for maximum flexibility and memory expansion by allowing output wire-OR connections. External termination of 50Ω to -2.0V or an equivalent circuit must be used to provide the specified output levels.

All outputs are forced to a logic LOW level when the RAM is being written into ($\overline{WE}$ = LOW). The output (or outputs) associated with a block (or blocks) of memory can be forced to a logic LOW level by deselecting that block (or blocks) with its respective Block Select input ($\overline{BS}0 - \overline{BS}3$ = HIGH).

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Rating	Value	Unit
V _{EE}	V _{EE} Pin Potential to V _{CC} Pin	+0.5 to -7.0	V
V _{IN}	Input Voltage	+0.5 to V _{EE}	V
I _{OUT}	DC Output Current (Output High)	-30	mA
T _C	Temperature Under Bias	-55 to +125	°C
T _{store}	Storage Temperature	-65 to +150	°C

NOTE:

1. Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. This is a stress rating only and functional operation is not implied at conditions other than those detailed in the operational sections of this data sheet. Exposure to ABSOLUTE MAXIMUM RATING conditions for extended periods may affect device reliability.

GUARANTEED OPERATING CONDITIONS

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage ⁽¹⁾	V _{EE}	-5.46	-5.2	-4.94	V
Case Temperature					
Supply Voltage ⁽¹⁾	V _{EE}	-4.8	-4.5	-4.2	V
Case Temperature					
Supply Voltage ⁽¹⁾	V _{EE}	-5.46	-5.2	-4.94	V
Case Temperature					

NOTE:

1. Referenced to V_{CC}.

RISE AND FALL TIME

Parameter	Code ⁽¹⁾	Symbol	Min.	Typ.	Max.	Unit
Output Rise Time	F S	t _r	—	500 1500	—	ps
Output Fall Time	F S	t _f	—	500 1500	—	ps

NOTE:

1. F = Fast Edge Rate
S = Standard Edge Rate

CAPACITANCE

Parameter	Symbol	Min.	Typ.	Max.	Unit
Input Pin Capacitance	C _{IN}	—	4	—	pF
Output Pin Capacitance	C _{OUT}	—	5	—	pF

10K DC ELECTRICAL CHARACTERISTICS

VCC = 0V; Tc = 0°C to +75°C; VEE = -5.2V; Airflow > 2.5m/s; Output Load = 50Ω to -2.0V

Symbol	Parameter	Tc	Min.	Max.	Unit	Condition
VOH	Output High Voltage	0°C +25°C +75°C	-1000 -960 -900	-840 -810 -720	mV	VIN = VIH Max. or VIL Min.
VOL	Output Low Voltage	0°C +25°C +75°C	-1870 -1850 -1830	-1665 -1650 -1625	mV	VIN = VIH Max. or VIL Min.
VOHC	Output High Voltage	0°C +25°C +75°C	-1020 -980 -920	— — —	mV	VIN = VIH Min. or VIL Max.
VOLC	Output Low Voltage	0°C +25°C +75°C	— — —	-1645 -1630 -1605	mV	VIN = VIH Min. or VIL Max.
VIH	Input High Voltage	0°C +25°C +75°C	-1145 -1105 -1045	-840 -810 -720	mV	Guaranteed Input Voltage High for All Inputs
VIL	Input Low Voltage	0°C +25°C +75°C	-1870 -1850 -1830	-1490 -1475 -1450	mV	Guaranteed Input Voltage Low for All Inputs
IiH	Input High Current	0°C to +75°C	0.0	20	μA	VIN = VIH Max.
IiL	Input Low Current	0°C to +75°C	-2	2	μA	VIN = VIL Min.
IiL	BS Input Low Current	0°C to +75°C	30	170	μA	VIN = VIL Min.
IiH	BS Input High Current	0°C to +75°C	40	220	μA	VIN = VIH Max.
IiL	WE Input Low Current	0°C to +75°C	-2	35	μA	VIN = VIL Min.
IiH	WE Input High Current	0°C to +75°C	0.0	60	μA	VIN = VIH Max.
IEE	Power Supply Current	-3ns, -4ns -5ns, -7ns 0°C to +75°C	-250 -200	— —	mA	All Inputs and Outputs Open

100K/101K DC ELECTRICAL CHARACTERISTICS

VCCA = 0V VEE = -4.5V (100K) Tc = 0°C to +85°C Airflow > 2.5m/s
VCC = 0V VEE = -5.2V (101K) Output Load = 50Ω to -2.0V

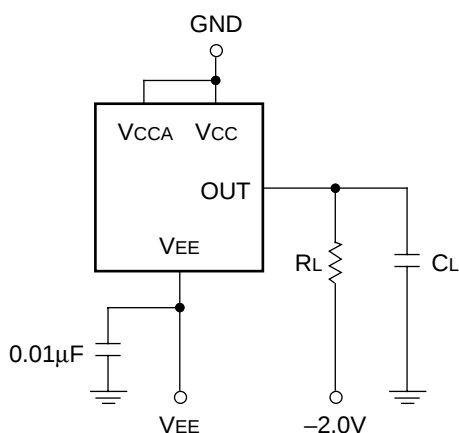
Symbol	Parameter	Min.	Max.	Unit	Condition
VOH	Output High Voltage	−1025	−880	mV	VIN = VIH Max. or VIL Min.
VOL	Output Low Voltage	−1810	−1620	mV	VIN = VIH Max. or VIL Min.
VOHC	Output High Voltage	−1035	—	mV	VIN = VIH Min. or VIL Max.
VOLC	Output Low Voltage	—	−1610	mV	VIN = VIH Min. or VIL Max.
VIH	Input High Voltage	−1165	−880	mV	Guaranteed Input Voltage High for All Inputs
VIL	Input Low Voltage	−1810	−1475	mV	Guaranteed Input Voltage Low for All Inputs
IiH	Input High Current	0.0	20	μA	VIN = VIH Max.
IiL	Input Low Current	−2	2	μA	VIN = VIL Min.
IiL	$\overline{\text{BS}}$ Input Low Current	30	170	μA	VIN = VIL Min.
IiH	$\overline{\text{BS}}$ Input High Current	40	220	μA	VIN = VIH Max.
IiL	$\overline{\text{WE}}$ Input Low Current	−2	35	μA	VIN = VIL Min.
IiH	$\overline{\text{WE}}$ Input High Current	0.0	60	μA	VIN = VIH Max.
IEE	Power Supply Current -3ns, -4ns -5ns, -7ns	−250 −200	— —	mA	All Inputs and Outputs Open

AC ELECTRICAL CHARACTERISTICS

AC TEST CONDITIONS

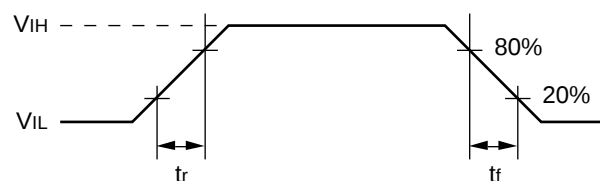
VCC = VCCA = 0V
VEE = -5.2V ± 5%(10K) Tc = 0°C to +75°C (10K)
VEE = -4.5V ± 0.3V(100K) Tc = 0°C to +85°C (100K/101K)
VEE = -5.2V ± 5%(101K) Airflow > 2.5m/s

Loading Condition



	Tc	VIH	VIL
10K	0°C +25°C +75°C	-0.933V -0.90V -0.863V	-1.733V -1.70V -1.663V
100/101K	0°C to +85°C	-0.90V	-1.70V

Input Pulse



tr = tf = 1.0ns typ.

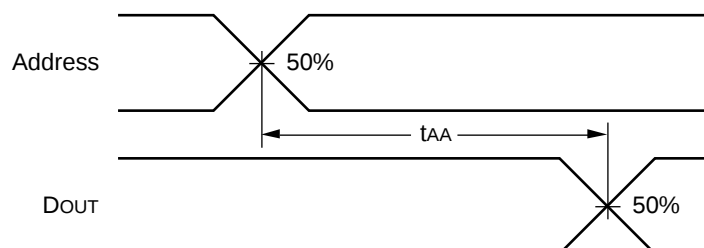
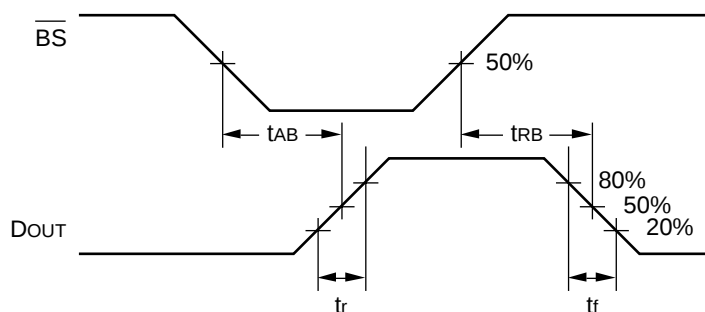
OUTPUT LOAD: RL = 50Ω
CL = 5pF* (typ.)
* (Modeled as 50Ω transmission line terminated to -2V.)

NOTE: All timing measurements referenced to 50% input levels.

READ CYCLE

Symbol		Parameter	SY10422-3 SY100422-3 SY101422-3		SY10422-4 SY100422-4 SY101422-4		SY10422-5 SY100422-5 SY101422-5		SY10422-7 SY100422-7 SY101422-7		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
tAA	TAVQV	Address Access Time	—	3	—	4	—	5	—	7	ns
tAB	TBSLQV	Block Select Access Time	—	2	—	2	—	3	—	3	ns
tRB	TBSHQL	Block Select Recovery Time	—	2	—	2	—	3	—	3	ns

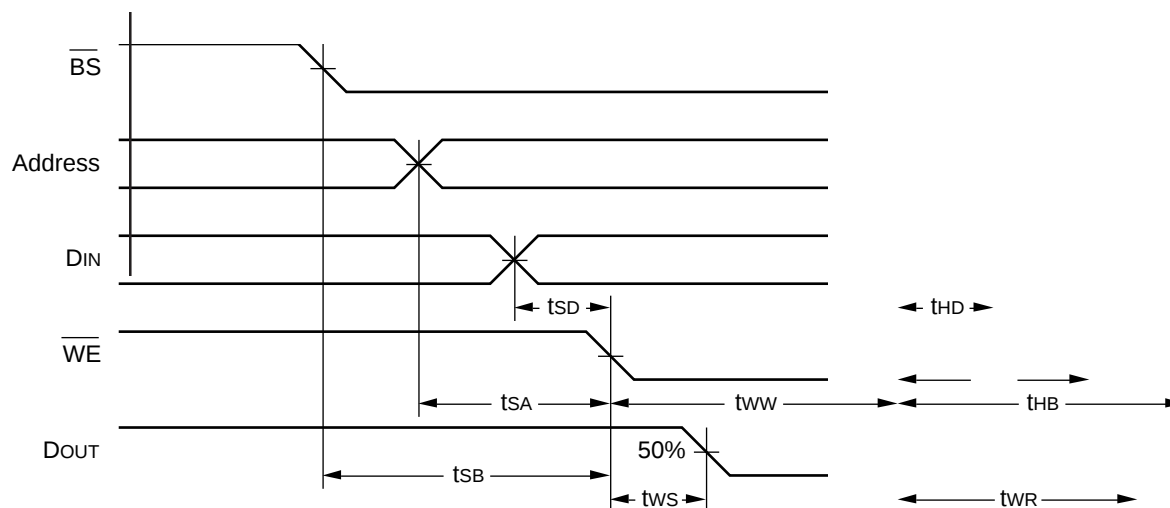
READ CYCLE TIMING DIAGRAM



READ CYCLE

Symbol		Parameter	SY10422-3 SY100422-3 SY101422-3		SY10422-4 SY100422-4 SY101422-4		SY10422-5 SY100422-5 SY101422-5		SY10422-7 SY100422-7 SY101422-7		Unit
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
tww	TWLWH	Write Pulse Width	3	—	4	—	5	—	5	—	ns
tws	TWLQL	Write Disable Time	—	3	—	4	—	4	—	4	ns
twr	TWHQV	Write Recovery Time	—	3	—	4	—	4	—	4	ns
tSA	TAVWL	Address Set-Up Time	1	—	1	—	1	—	1	—	ns
tSB	TBSLWL	Block Select Set-Up Time	0	—	0	—	1	—	1	—	ns
tSD	TDVWL	Data Set-Up Time	0	—	0	—	1	—	1	—	ns
tHA	TWHAX	Address Hold Time	1	—	1	—	1	—	1	—	ns
tHB	TWHBSX	Block Select Hold Time	1	—	1	—	1	—	1	—	ns
tHD	TWHDX	Data Hold Time	1	—	1	—	1	—	1	—	ns

WRITE CYCLE TIMING DIAGRAM



PRODUCT ORDERING CODE

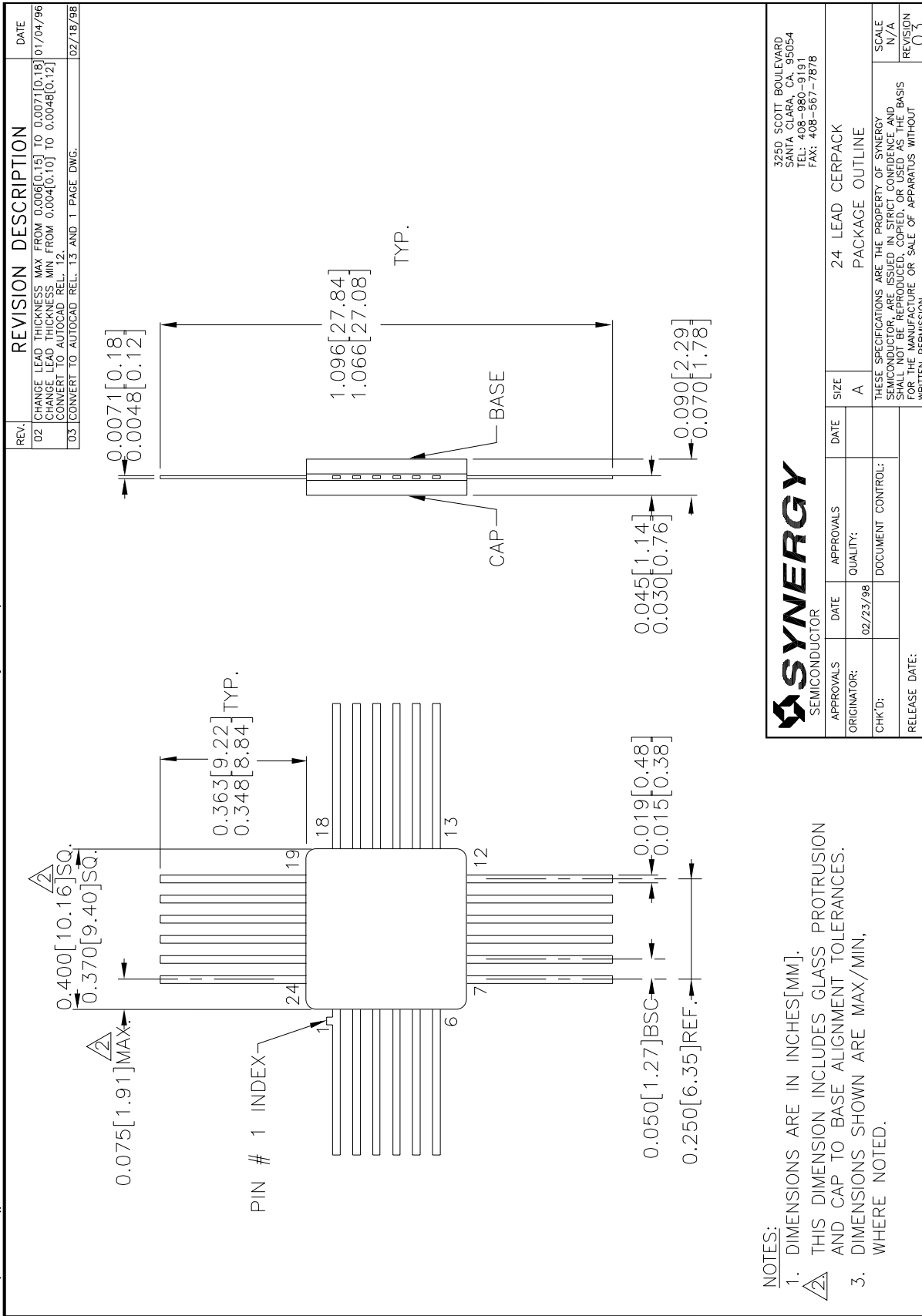
Speed (ns)	Ordering Code	Edge Rate	Package Type	Operating Range
3	SY10/100/101422-3FCF	Fast	F24-1	Commercial
	SY10/100/101422-3MCF	Fast	M28-1	Commercial
4	SY10/100/101422-4FCF	Fast	F24-1	Commercial
	SY10/100/101422-4MCF	Fast	M28-1	Commercial
5	SY10/100/101422-5FCS	Standard	F24-1	Commercial
	SY10/100/101422-5JCS	Standard	J28-1	Commercial
7	SY10/100/101422-7FCS	Standard	F24-1	Commercial
	SY10/100/101422-7JCS	Standard	J28-1	Commercial

24 LEAD CERPACK (F24-1)

FILE/REV #: PD0006A03

PD/0006/ASCORP

PAGE 1 OF 1

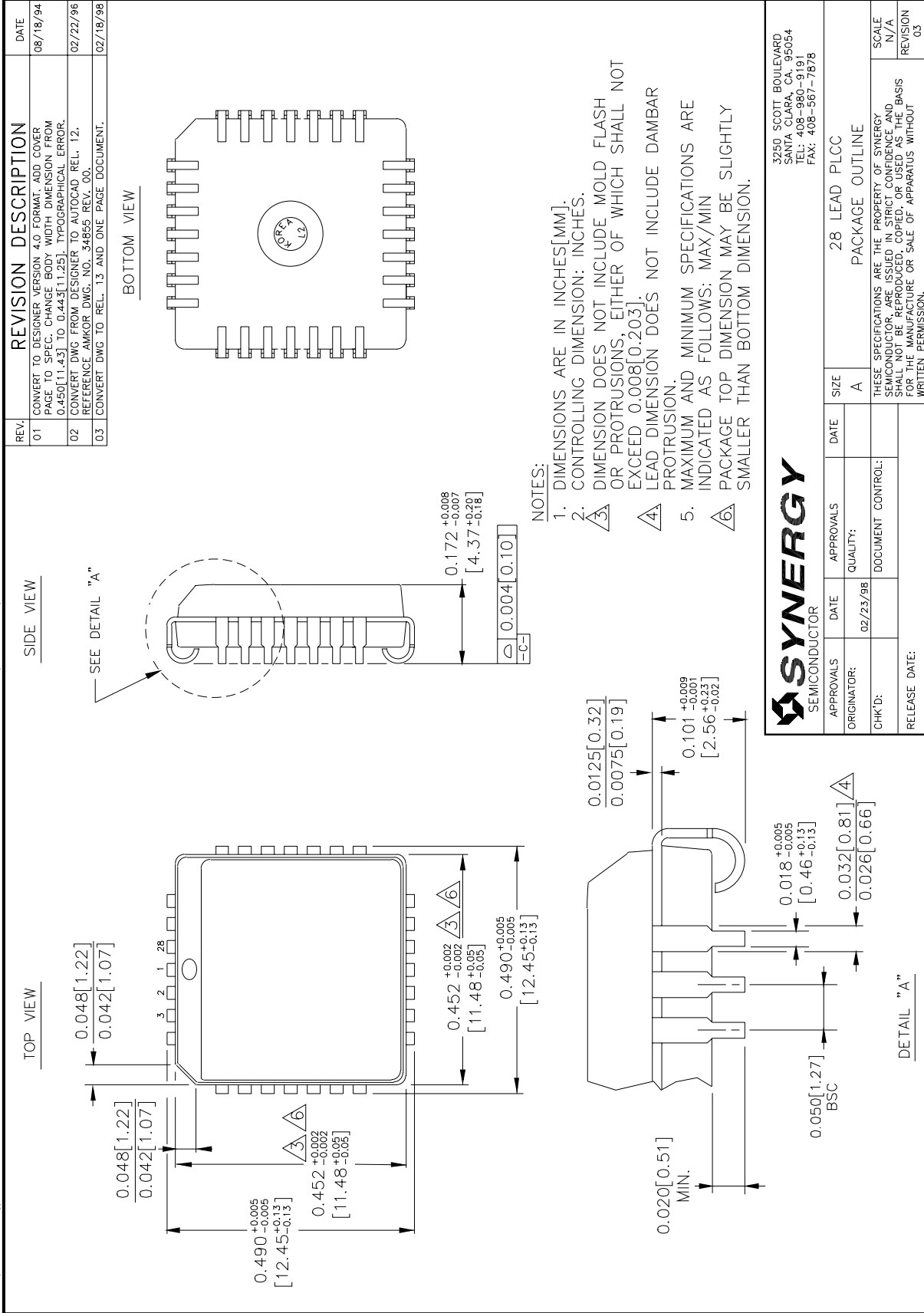


28 LEAD PLASTIC LEADED CHIP CARRIER (J28-1)

FILE/REV #: PD0008A03

PD/0008/ASCORP

PAGE 1 OF 1



28 LEAD METAL QUAD PLASTIC LEADER CHIP CARRIER (M28-1)

FILE/REV #: PD0023A04

PD/0023/ASCORP

PAGE 1 OF 1

