Cover Sheet and Revision Status

版別 (Rev.)	DCC No.	生效日 (Eff. Date)	變更說明 (Change Description)	發行人 (Originator)
1.0	20160064	Jul. 12, 2016	New issue	Hank Lin
2.0	20170013	Jun. 22, 2017	Revise 32L STSOP(I)-8x13.4mm package outline	Hank Lin
3.0	20200019	Dec. 29, 2020	Revise ICC (operating current) 45ns- 20mA, 55ns- 20mA, 70ns- 15mA	Hnak Lin

GENERAL DESCRIPTION

The CS18LV21493 is a high performance, high speed, and super low power CMOS Static Random Access Memory organized as 262,144 words by 8 bits and operates from a wide range of 2.7 to 3.6V supply voltage. Advanced CMOS technology and circuit techniques provide both high speed and low power features with a typical CMOS standby current of 2uA and maximum access time of 45/55/70ns in 3.0V operation. Easy memory expansion is provided by an active LOW chip enable inputs (/CE1, CE2) and active LOW output enable (/OE) and three-state output drivers.

The CS18LV21493 has an automatic power down feature, reducing the power consumption significantly when chip is deselected. The CS18LV21493 is available in JEDEC standard 32-pin sTSOP 1 -8x13.4 mm, TSOP 1 -8x20 mm, TSOP 2 –400 mil; SOP -450 mil.

.

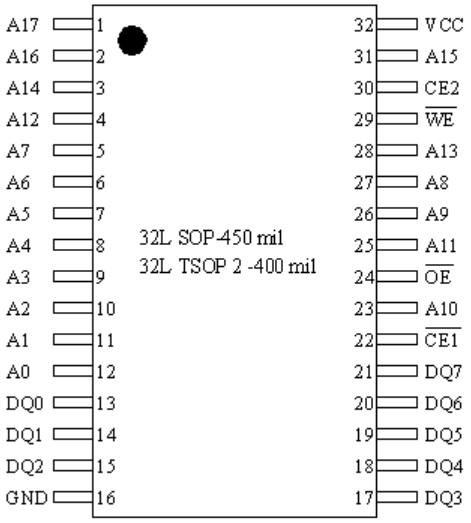
FEATURES

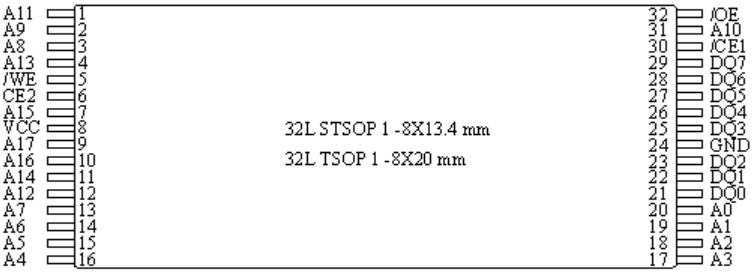
- Low operation voltage : 2.7 ~ 3.6V
- Ultra low power consumption :
  - operating current: 20mA (Max.) @t_{AA}=45ns
  - standby current : 2uA (Typ.)
- Fast access time: 45/55/70ns (Max.)
- Automatic power down when chip is deselected.
- Three state outputs and TTL compatible, fully static operation
- Data retention supply voltage as low as 1.5V.
- Easy expansion with /CE1, CE2 and /OE options.

Product Family

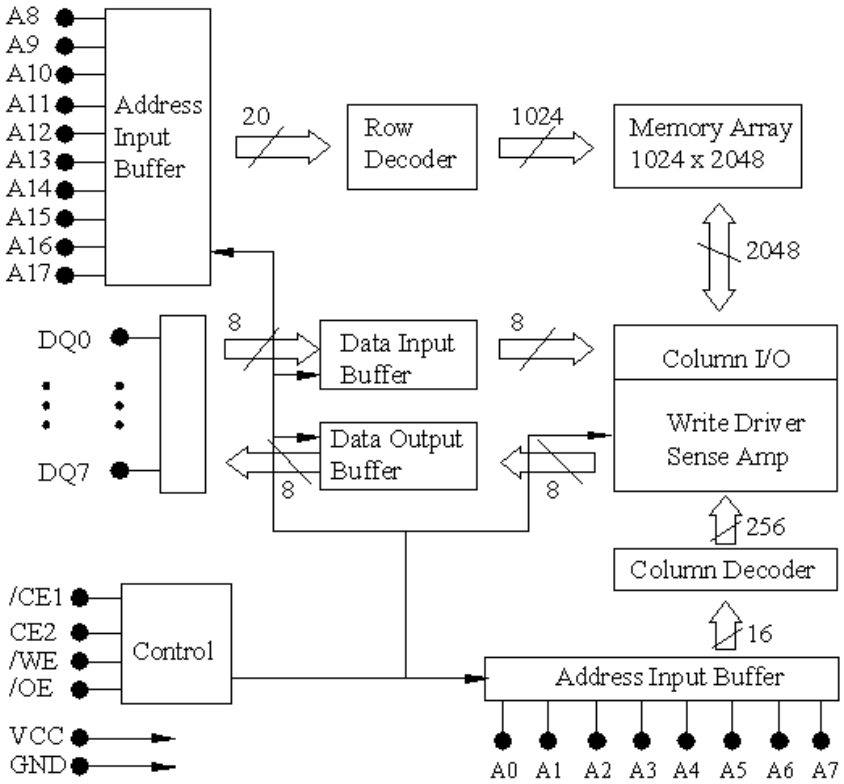
Product Family	Operating Temp	Standby (Max.) (V_{CC} = 3.6V)	V_{CC} Range (V)	Speed (ns)	Package Type
CS18LV21493	0~70°C	8 uA	2.7~3.6	45/55/70	32L SOP 32L STSOP 1 32L TSOP 1 32L TSOP 2 Dice
	-40~85°C				

PIN CONFIGURATIONS





FUNCTIONAL BLOCK DIAGRAM



PIN DESCRIPTIONS

Name	Type	Function
A0 – A17	Input	Address inputs for selecting one of the 262,144 x 8 bit words in the RAM
/CE1, CE2	Input	/CE1 is active LOW and CE2 is active HIGH. Both chip enables must be active when data read from or write to the device. If either chip enable is not active, the device is deselected and in a standby power down mode. The DQ pins will be in high impedance state when the device is deselected.
/WE	Input	The Write enable input is active LOW. It controls read and write operations. With the chip selected, when /WE is HIGH and /OE is LOW, output data will be present on the DQ pins, when /WE is LOW, the data present on the DQ pins will be written into the selected memory location.
/OE	Input	The output enable input is active LOW. If the output enable is active while the chip is selected and the write enable is inactive, data will be present on the DQ pins and they will be enabled. The DQ pins will be in the high impedance state when /OE is inactive.
DQ0~DQ7	I/O	These 8 bi-directional ports are used to read data from or write data into the RAM.
V_{CC}	Power	Power Supply
Gnd	Power	Ground
NC		No connection

TRUTH TABLE

MODE	/CE1	CE2	/WE	/OE	DQ0~7	V_{CC} Current
Standby	H	X	X	X	High Z	I_{CCSB}, I_{CCSB1}
	X	L	X	X		
Output Disabled	L	H	H	H	High Z	I_{CC}
Read	L	H	H	L	D_{OUT}	I_{CC}
Write	L	H	L	X	D_{IN}	I_{CC}

ABSOLUTE MAXIMUM RATINGS (1)

Symbol	Parameter	Rating	Unit
V_{TERM}	Terminal Voltage with Respect to GND	-0.5 to Vcc+0.5	V
T_{BIAS}	Temperature Under Bias	-40 to +125	^{O}C
T_{STG}	Storage Temperature	-60 to +150	^{O}C
P_T	Power Dissipation	1.0	W

1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device 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 reliability.

OPERATING RANGE

Range	Ambient Temperature	V_{CC}
Commercial	0~70°C	2.7V ~ 3.6V
Industrial	-40~85°C	2.7V ~ 3.6V

CAPACITANCE (1) (TA = 25°C, f =1.0 MHz)

Symbol	Parameter	Conditions	MAX.	Unit
C_{IN}	Input Capacitance	V_{IN}=0V	6	pF
C_{DQ}	Input/output Capacitance	$V_{I/O}$=0V	8	pF

This parameter is guaranteed and not tested.

DC ELECTRICAL CHARACTERISTICS (T_A = 0 to + 70°C, V_{CC}= 3.0V)

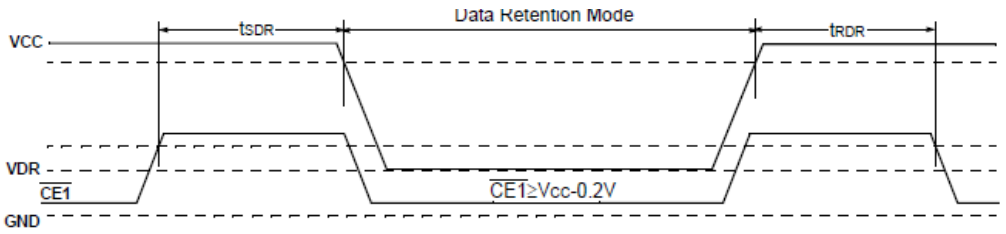
Parameter Name	Parameter	Test Conduction		MIN	TYP (1)	MAX	Unit
V_{IL}	Guaranteed Input Low Voltage (2)			-0.3		0.8	V
V_{IH}	Guaranteed Input High Voltage (2)			2.2		Vcc+ 0.3	V
I_{IL}	Input Leakage Current	V_{CC}=MAX, V_{IN}=0 to V_{CC}		-1		1	uA
I_{OL}	Output Leakage Current	V_{CC}=MAX, /CE=V_{IN}, or /OE=V_{IN}, V_{IO}=0V to V_{CC}		-1		1	uA
V_{OL}	Output Low Voltage(3)	V_{CC}=MAX, I_{OL} = 2mA				0.4	V
V_{OH}	Output High Voltage(2)	V_{CC}=MIN, I_{OH} = -1mA		2.4			V
I_{CC}	Operating Power Supply Current	/CE=V_{IL}, I_{DQ}=0mA, F=F_{MAX} (3)	45ns	-	-	20	mA
			55ns	-	-	20	
			70ns	-	-	15	
I_{CCSB}	Standby Supply - TTL	/CE=V_{IH}, I_{DQ}=0mA,				0.3	mA
I_{CCSB1}	Standby Current -CMOS	/CE≧V_{CC}-0.2V, V_{IN}≧V_{CC}-0.2V or V_{IN}≦0.2V			2	8	uA

1. *Typical characteristics are at TA = 25oC.*
2. *Overshoot: V_{CC} +2.0V in case of pulse width ≦20ns.*
3. *Undershoot: - 2.0V in case of pulse width ≦20ns.*
4. *Overshoot and undershoot are sampled, not 100% tested.*

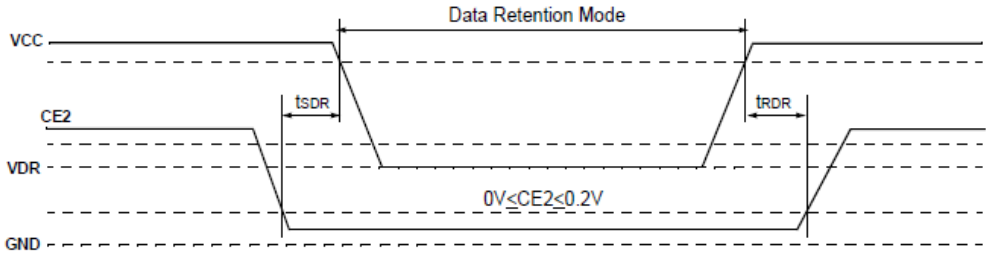
DATA RETENTION CHARACTERISTICS (T_A = 0 to + 70°C)

Parameter Name	Parameter	Test Conduction	MIN	TYP	MAX	Unit
V_{DR}	V_{CC} for Data Retention	/CE≧V_{CC}-0.2V, V_{IN}≧V_{CC}-0.2V or V_{IN}≦0.2V	1.5			V
I_{CCDR}	Data Retention Current	/CE≧V_{CC}-0.2V, V_{CC}=1.5V V_{IN}≧V_{CC}-0.2V or V_{IN}≦0.2V		2	6	uA
T_{CDR}	Chip Deselect to Data Retention Time	See Retention Waveform	0			ns
t_R	Operation Recovery Time		t_{RC}			ns

LOW Vcc DATA RETENTION WAVEFORM (1) (/CE1 Controlled)



LOW Vcc DATA RETENTION WAVEFORM (2) (CE2 Controlled)



AC TEST CONDITIONS

Input Pulse Levels	Vcc/0V
Input Rise and Fall Times	3ns
Input and Output Timing Reference Level	0.5Vcc
Output Load	See FIGURE 1A and 1B

KEY TO SWITCHING WAVEFORMS

WAVEFORMS	INPUTS	OUTPUTS
	MUST BE STEADY	MUST BE STEADY
	MAY CHANGE FROM H TO L	WILL BE CHANGE FROM H TO L
	MAY CHANGE FROM L TO H	WILL BE CHANGE FROM L TO H
	DON'T CARE ANY CHANGE PERMITTED	CHANGE STATE UNKNOWN
	DOES NOT APPLY	CENTER LINE IS HIGH IMPEDANCE OFF STATE

AC TEST LOADS AND WAVEFORMS

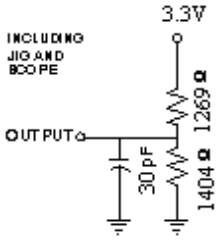


FIGURE 1A

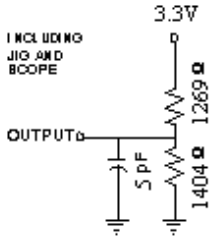


FIGURE 1B

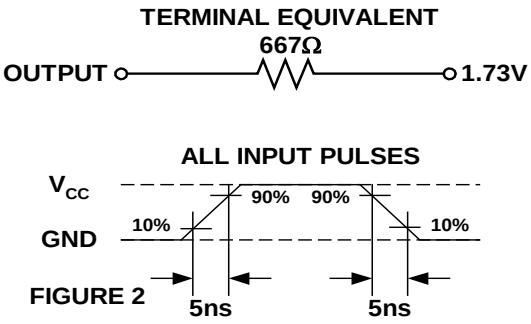


FIGURE 2

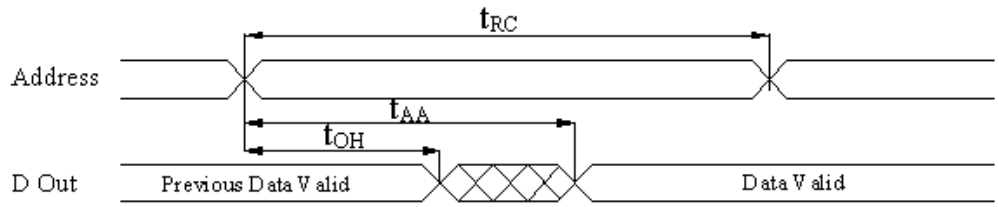
AC ELECTRICAL CHARACTERISTICS (T_A = 0 to + 70oC, V_{CC} = 3.0V)

< READ CYCLE >

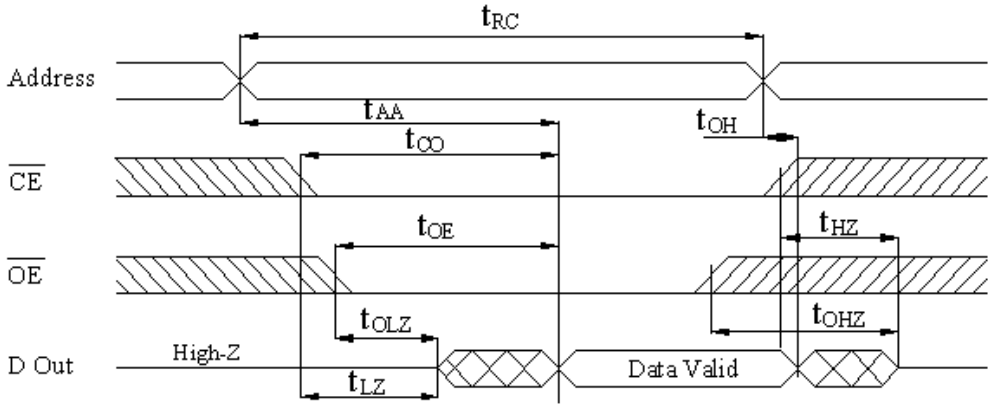
JEDEC Parameter Name	Parameter Name	Description	45ns		55ns		70ns		Unit
			MIN	MAX	MIN	MAX	MIN	MAX	
t_{AVAX}	t_{RC}	Read Cycle Time	45		55		70		ns
t_{AVQV}	t_{AA}	Address Access Time		45		55		70	ns
t_{ELQV}	t_{CO}	Chip Select Access Time		45		55		70	ns
t_{GLQV}	t_{OE}	Output Enable to Output Valid		22		25		35	ns
t_{ELQX}	t_{LZ}	Chip Select to Output Low Z	10		10		10		ns
t_{GLQX}	t_{OLZ}	Output Enable to Output in Low Z	5		5		5		ns
t_{EHQZ}	t_{CHZ}	Chip Deselect to Output in High Z		18		20		25	ns
t_{GHQZ}	t_{OHZ}	Output Disable to Output in High Z		18		20		25	ns
t_{AXOX}	t_{OH}	Out Disable to Address Change	10		10		10		ns

SWITCHING WAVEFORMS (READ CYCLE)

READ CYCLE 1



READ CYCLE 2



NOTES:

1. *t_{HZ} and t_{OHZ} are defined as the outputs achieve the open circuit conditions and are not referenced to output voltage levels.*
2. *At any given temperature and voltage condition, t~~HZ~~ (Max.) is less than t_{LZ} (Min.) both for a given device and from device to device interconnection.*

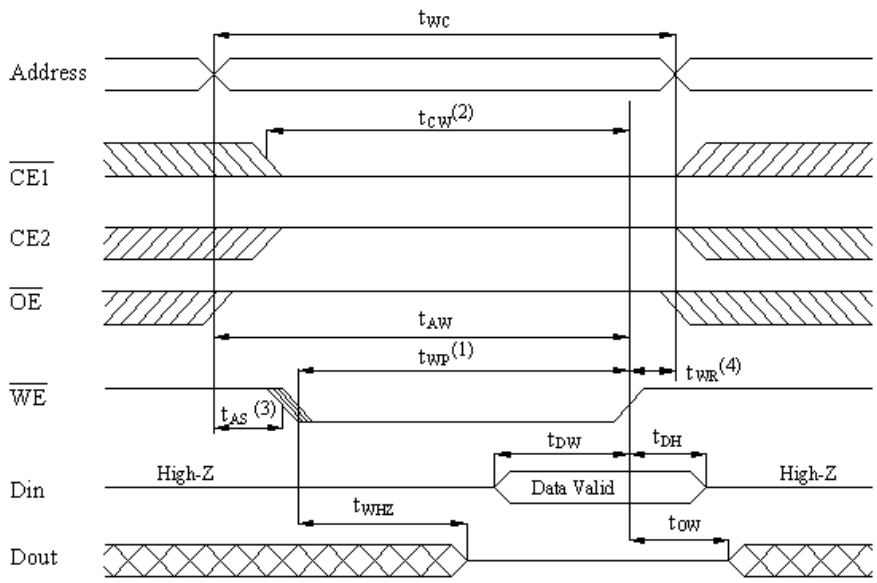
AC ELECTRICAL CHARACTERISTICS (T_A = 0 to + 70°C, Vcc = 3.0V)

< WRITE CYCLE >

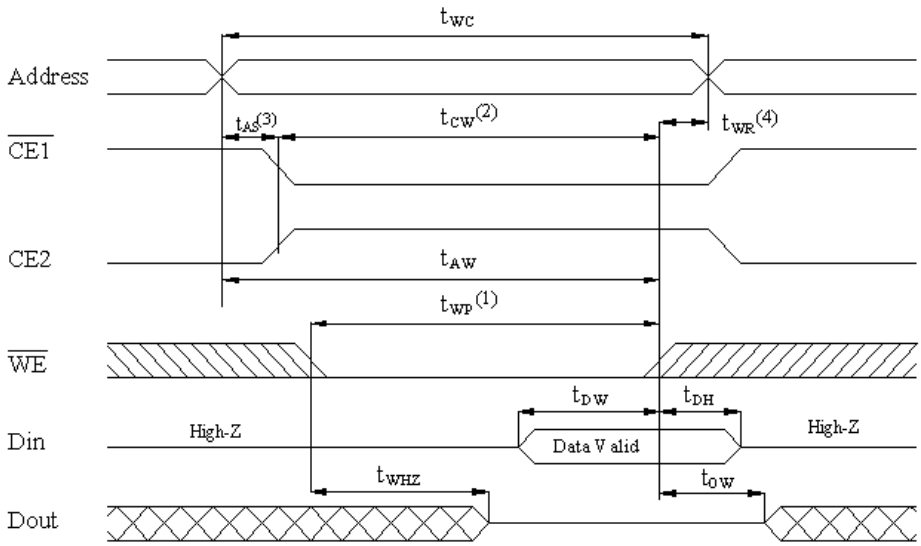
JEDEC Parameter Name	Parameter Name	Description	45ns		55ns		70ns		Unit
			MIN	MXA	MIN	MAX	MIN	MAX	
t_{AVAX}	t_{WC}	Write Cycle Time	45		55		70		ns
t_{E1LWH}	t_{CW}	Chip Select to End of Write	35		45		60		ns
t_{AVWL}	t_{AS}	Address Setup Time	0		0		0		ns
t_{AVWH}	t_{AW}	Address Valid to End of Write	35		45		60		ns
t_{WLWH}	t_{WP}	Write Pulse Width	35		40		55		ns
t_{WHAX}	t_{WR}	Write Recovery Time	0		0		0		ns
t_{WLQZ}	t_{WHZ}	Write to Output in High Z		18		20		25	ns
t_{DVWH}	t_{DW}	Data to Write Time Overlap	25		25		30		ns
t_{WHDX}	t_{DH}	Data Hold from Write Time	0		0		0		ns
t_{WHOX}	t_{OW}	End of Write to Output Active	5		5		5		ns

SWITCHING WAVEFORMS (WRITE CYCLE)

WRITE CYCLE 1 (/WE controlled)



WRITE CYCLE 2 (/CE1 and CE2 controlled)



NOTES:

1. *A write occurs during the overlap (t_{WP}) of low /CE1, a high CE2 and low /WE. A write begins when /CE1 goes low, CE2 going high and /WE goes low. A write ends at the earliest transition when /CE1 goes high, CE2 goes high an /WE goes high. The tWP is measured from the beginning of the write to the end of write.*
2. *t_{CW} is measured from the /CE1 going low or CE2 going low to end of write.*
3. *t_{AS} is measured from the address valid to the beginning of write.*
4. *t_{WR} is measured from the end or write to the address change. TWR applied in case a write ends as /CE1 or /WE going high or CE2 going low.*

ORDER INFORMATION

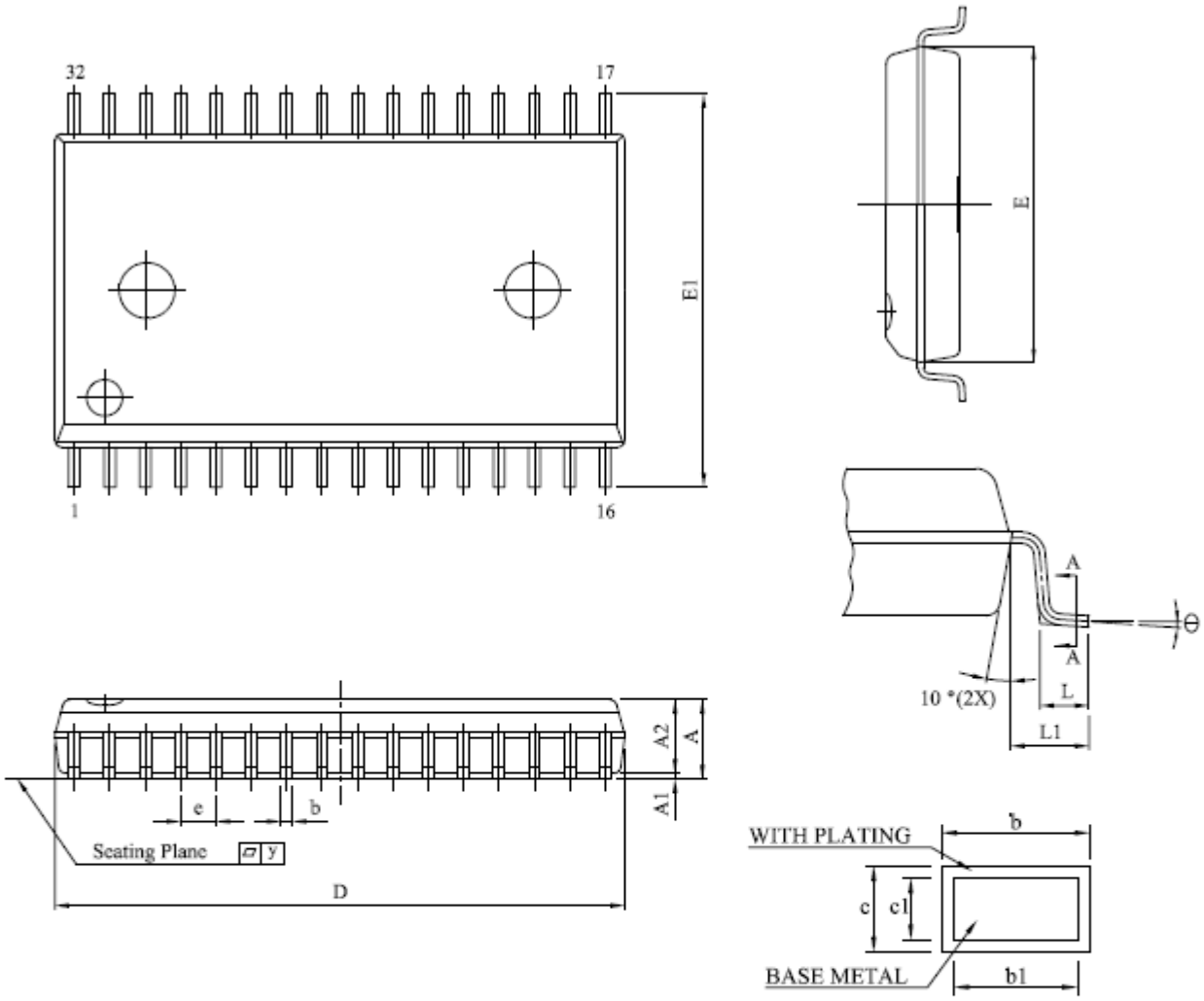
CS18LV21493X X X X XX

- Version: Blank: First Version; A: Second Version; ..
- Temperature: C: 0~70°C; I: -40~85°C
- Speed: 45: 45ns; 55: 55ns; 70: 70ns
- Package: C: 32L SOP-450mil; D: 32L STSOP(I)-8x13.4mm; E: 32L TSOP(I)-8x20mm; F: 32L TSOP(II)-400mil; Z: Dice
- Package Material: -: Normal; R: Lead and Halogen Free

Note: Package material code "R" meets ROHS

PACKAGE OUTLINE

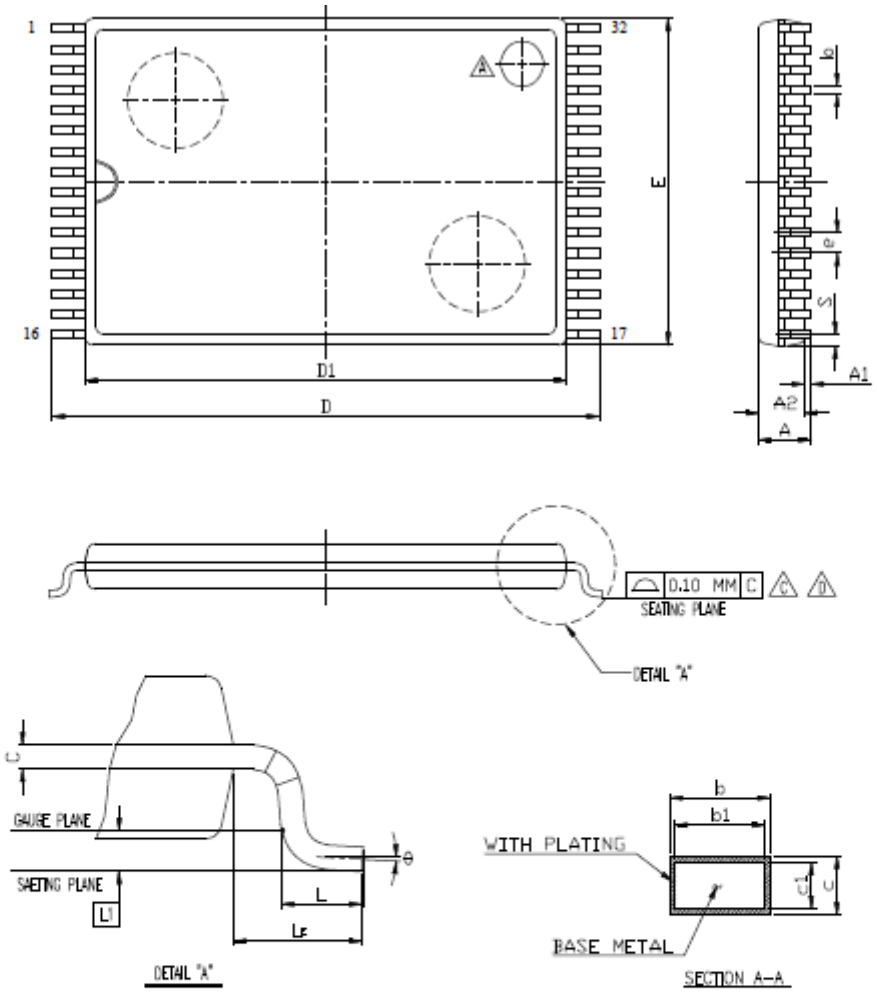
32L SOP-450mil



Note: Plating thickness spec : 0.3 mil ~ 0.8 mil.

SYMBOL / UNIT		A	A1	A2	b	b1	c	c1	D	E	E1	e	L	L1	y	θ
mm	Min.	2.645	0.102	2.540	0.35	0.35	0.15	0.15	20.320	11.176	13.792	1.118	0.584	1.194	–	0°
	Nom.	2.821	0.229	2.680	–	–	–	–	20.447	11.303	14.097	1.270	0.834	1.397	–	–
	Max.	2.997	0.356	2.820	0.50	0.46	0.32	0.28	20.574	11.430	14.402	1.422	1.084	1.600	0.1	10°
inch	Min.	0.104	0.004	0.1000	0.014	0.014	0.006	0.006	0.800	0.440	0.543	0.044	0.023	0.047	–	0°
	Nom.	0.111	0.009	0.1055	–	–	–	–	0.805	0.445	0.555	0.050	0.033	0.055	–	–
	Max.	0.118	0.014	0.1110	0.020	0.018	0.012	0.011	0.810	0.450	0.567	0.056	0.043	0.063	0.004	10°

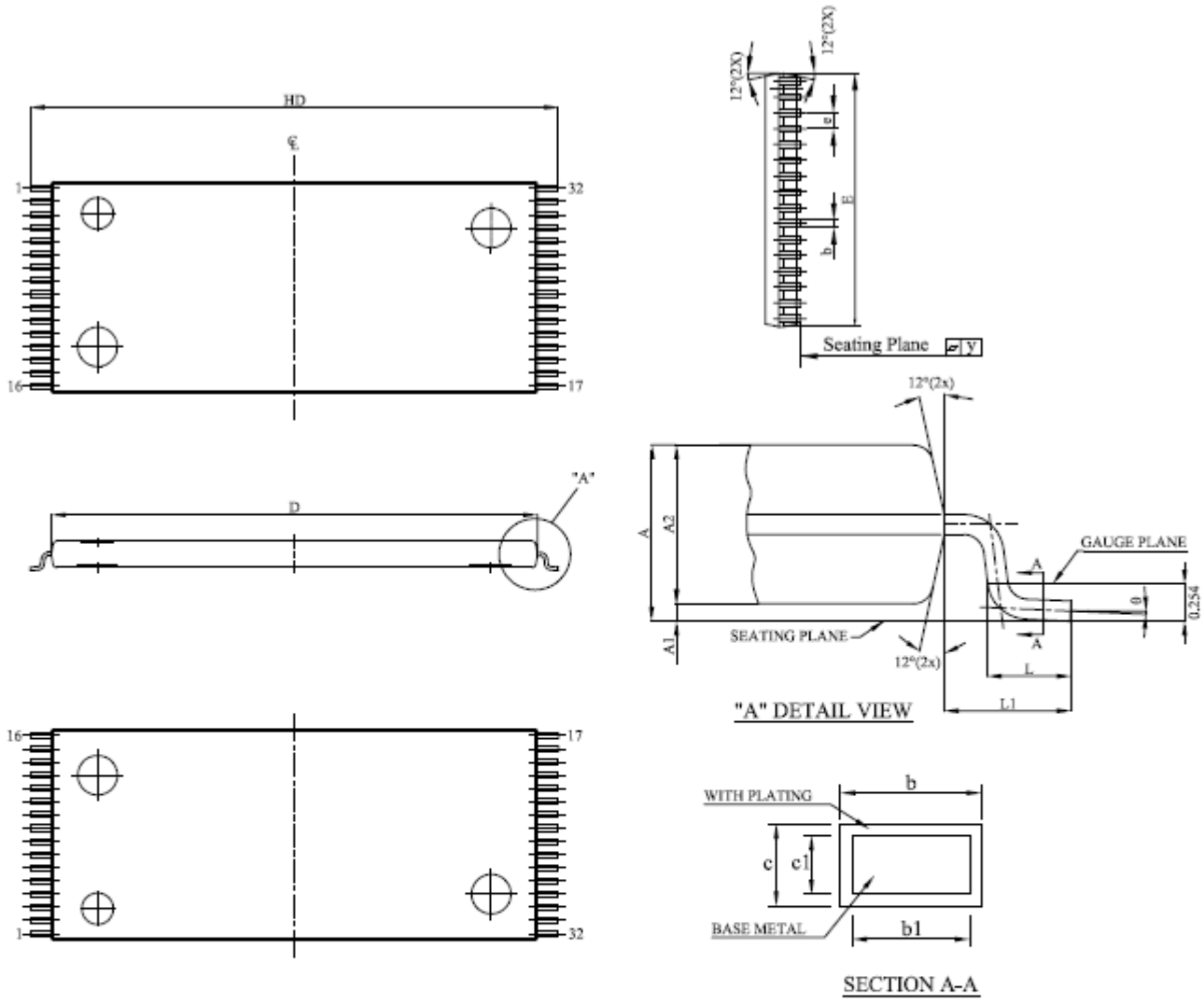
32L STSOP(I)-8x13.4mm



Note: Dimensions D1 and E do not include mold protrusions.
D1 and E are maximun plastic body size dimensions including mold mismatch.

SYMBOL / UNIT		A	A1	A2	b	b1	c	c1	E	e	D	D1	L	L1	LE	S	θ
mm	Min.		0.05	0.90	0.17	0.17	0.10	0.10	7.90	0.50 TYP.	13.20	11.70	0.30	0.25 BSC	0.675	0.278 TYP.	0
	Nom.			1.00	0.22	0.20	–	–	8.00		13.40	11.80	0.50				3
	Max.	1.20		1.05	0.27	0.23	0.21	0.16	8.10		13.60	11.90	0.70				5
inch	Min.		0.002	0.035	0.007	0.007	0.004	0.004	0.311	0.020 TYP.	0.520	0.461	0.012	0.010 BSC	0.027	0.0109 TYP.	0
	Nom.			0.039	0.009	0.008	–	–	0.315		0.528	0.465	0.020				3
	Max.	0.047		0.041	0.011	0.009	0.008	0.006	0.319		0.535	0.469	0.028				5

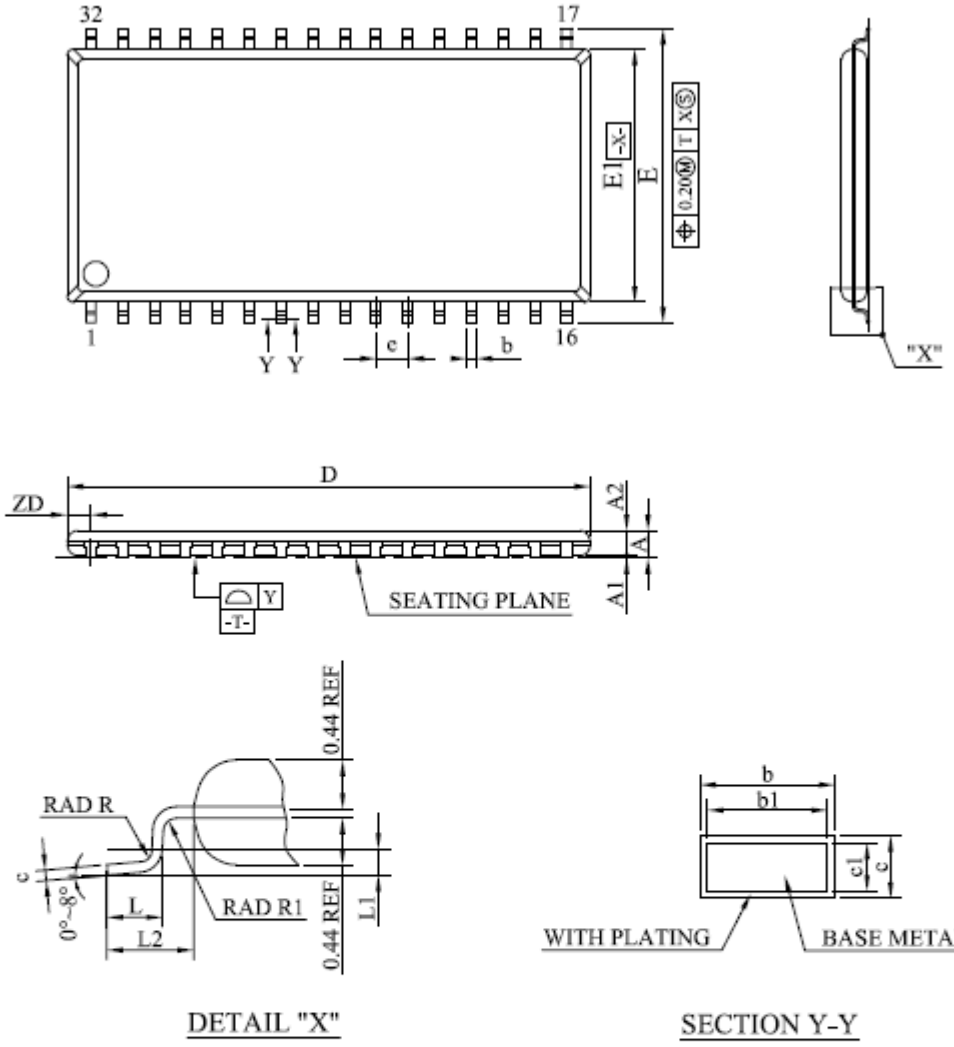
32L TSOP(I)-8x20mm



Note: Plating thickness spec : 0.3 mil ~ 0.8 mil.

SYMBOL / UNIT		A	A1	A2	b	b1	c	c1	D	E	e	HD	L	L1	y	Θ
mm	Min.	1.00	0.05	0.95	0.17	0.17	0.10	0.10	18.30	7.90	0.40	19.80	0.40	0.70	–	0°
	Nom.	1.10	0.10	1.00	0.22	0.20	–	–	18.40	8.00	0.50	20.00	0.50	0.80	–	–
	Max.	1.20	0.15	1.05	0.27	0.23	0.21	0.16	18.50	8.10	0.60	20.20	0.70	0.90	0.1	8°
inch	Min.	0.0393	0.002	0.037	0.007	0.007	0.004	0.004	0.720	0.311	0.016	0.779	0.0157	0.0275	–	0°
	Nom.	0.0433	0.004	0.039	0.009	0.008	–	–	0.724	0.315	0.020	0.787	0.0197	0.0315	–	–
	Max.	0.0473	0.006	0.041	0.011	0.009	0.008	0.006	0.728	0.319	0.024	0.795	0.0277	0.0355	0.004	8°

32L TSOP2-400mil



DETAIL "X" SECTION Y-Y

Note: Plating thickness spec : 0.3 mil ~ 0.8 mil.

SYMBOL / UNIT		A	A1	A2	b	b1	c	c1	D	E	E1	e	L	L1	L2	R	R1	ZD	Y
mm	Min.	–	0.05	0.95	0.30	0.30	0.12	0.10	20.82	11.56	10.03	1.27 bsc	0.40	0.25 bsc	0.8 ref	0.12	0.12	0.95 ref	–
	Nom.	–	0.10	1.00	–	0.40	–	0.127	20.95	11.76	10.16		0.50			–	–		–
	Max.	1.20	0.15	1.05	0.52	0.45	0.21	0.16	21.08	11.96	10.29		0.60			0.25	–		0.10
inch	Min.	–	0.002	0.037	0.012	0.012	0.005	0.004	0.820	0.455	0.394	0.050 bsc	0.016	0.010 bsc	0.031 ref	0.005	0.005	0.037 ref	–
	Nom.	–	0.004	0.039	–	0.016	–	0.005	0.825	0.463	0.400		0.020			–	–		–
	Max.	0.047	0.006	0.042	0.020	0.018	0.008	0.006	0.830	0.471	0.405		0.024			0.010	–		0.004