

MOS INTEGRATED CIRCUIT

μPD42S16800L, 42S17800L

16 M BIT DYNAMIC RAM
(3.3 V FAST PAGE MODE)

PRELIMINARY

DESCRIPTION

The NEC μPD42S16800L and μPD42S17800L are 2 097 152 words by 8 bits dynamic CMOS RAM with optional fast page mode. CMOS sense amplifier, peripheral circuits and 1 transistor memory cell technique realize high speed access, cycle time and low power dissipation.

Refresh is accomplished by performing RAS only refresh cycles, hidden refresh cycles, CAS before RAS refresh cycles, CAS before RAS self refresh cycles or normal read or write cycles on the 4096 address combinations of A0 to A11 (for μPD42S16800L) or 2048 address combinations of A0 to A10 (for μPD42S17800L) during a 256 ms period.

The μPD42S16800L and μPD42S17800L are packaged in 28-pin plastic SOJ and 28-pin plastic ZIP and 28-pin plastic TSOP.

FEATURES

- 2 097 152 words by 8 bits organization
- 4 performance ranges

DEVICE	ACCESS TIME (MAX.)	R/W CYCLE (MIN.)	PAGE MODE CYCLE (MIN.)	Low power dissipation	
				Active(MAX.)	Standby
μPD42S16800L-A60	60 ns	110 ns	40 ns	288 mW	0.36 mW (MAX.) (CMOS level)
μPD42S17800L-A60				360 mW	
μPD42S16800L-A70	70 ns	130 ns	45 ns	252 mW	
μPD42S17800L-A70				324 mW	
μPD42S16800L-A80	80 ns	150 ns	50 ns	216 mW	
μPD42S17800L-A80				288 mW	

- Single +3.3V±0.3V power supply
- On-chip substrate bias generator
- Multiplexed address inputs

DEVICE	Row Address	Column Address	Refresh cycle
μPD42S16800L	A0 to A11	A0 to A8	4096 cycles/256 ms
μPD42S17800L	A0 to A10	A0 to A9	2048 cycles/256 ms

- Non latched I/O, TTL-compatible
- Read-modify-write, Fast Page Mode capability
- RAS only refresh, hidden refresh and CAS before RAS internal address refresh
- CAS before RAS self refresh

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ORDERING INFORMATION

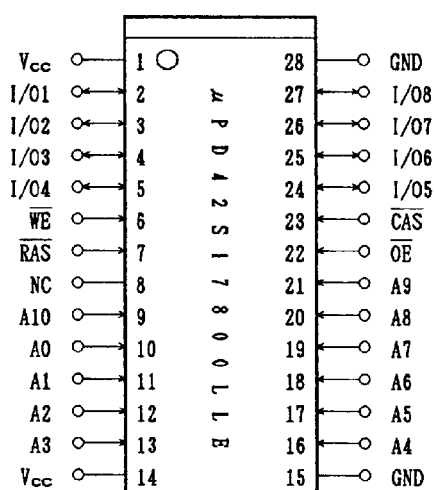
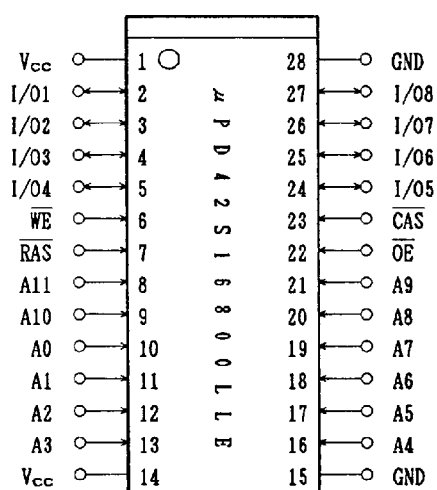
PART NUMBER	ACCESS TIME (MAX.)	PACKAGE	QUALITY GRADE
μ PD42S16800LLE-A60	60ns	28-pin Plastic SOJ	STANDARD
μ PD42S17800LLE-A60			
μ PD42S16800LLE-A70	70ns		
μ PD42S17800LLE-A70			
μ PD42S16800LLE-A80	80ns		
μ PD42S17800LLE-A80			
μ PD42S16800LV-A60	60ns	28-pin Plastic ZIP (under development)	
μ PD42S17800LV-A60			
μ PD42S16800LV-A70	70ns		
μ PD42S17800LV-A70			
μ PD42S16800LV-A80	80ns		
μ PD42S17800LV-A80			
μ PD42S16800LG5-A60-7JD	60ns	28-pin Plastic TSOP	
μ PD42S17800LG5-A60-7JD			
μ PD42S16800LG5-A70-7JD	70ns		
μ PD42S17800LG5-A70-7JD			
μ PD42S16800LG5-A80-7JD	80ns		
μ PD42S17800LG5-A80-7JD			
μ PD42S16800LG5-A60-7KD	60ns	28-pin Plastic TSOP (Reverse bent)	
μ PD42S17800LG5-A60-7KD			
μ PD42S16800LG5-A70-7KD	70ns		
μ PD42S17800LG5-A70-7KD			
μ PD42S16800LG5-A80-7KD	80ns		
μ PD42S17800LG5-A80-7KD			

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number 1E1-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

PIN CONFIGURATION (Marking Side)

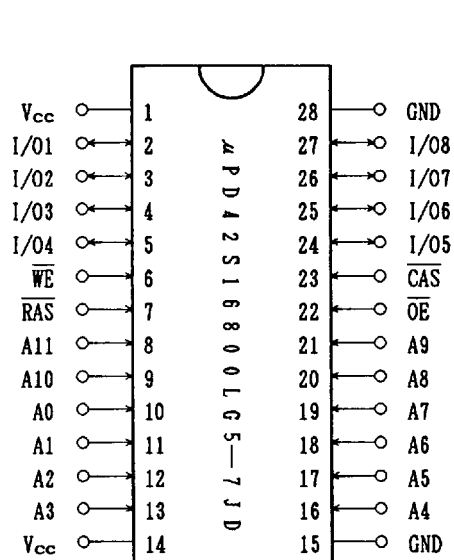
A0 to A10(A11) : Address Inputs
 I/O1 to I/O8 : Data Inputs/Outputs
 $\overline{\text{RAS}}$: Row Address Strobe
 $\overline{\text{CAS}}$: Column Address Strobe
 $\overline{\text{WE}}$: Write Enable
 $\overline{\text{OE}}$: Output Enable
 V_{CC} : Supply Voltage
 GND : Ground
 NC : No Connection

28-pin Plastic SOJ (400 mil)

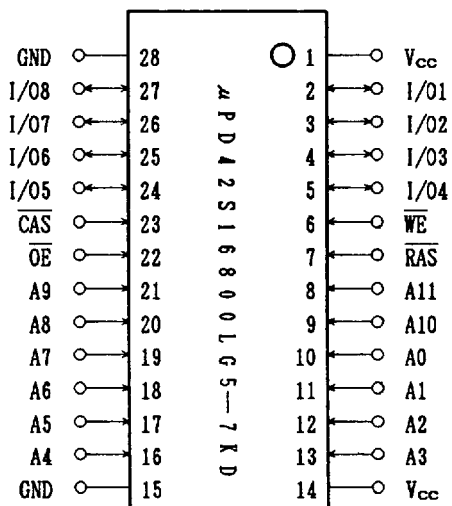


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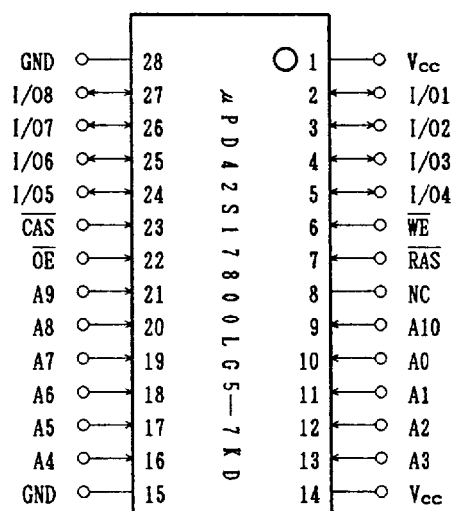
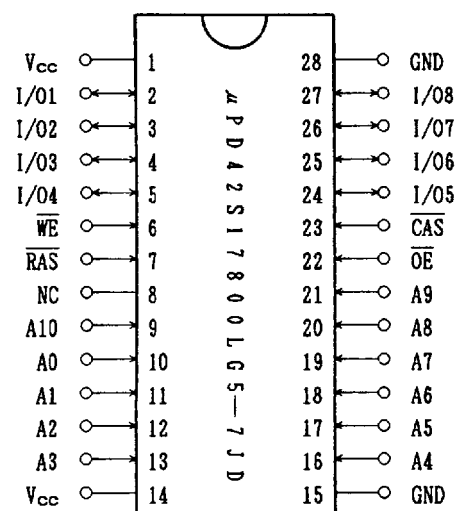
28-pin Plastic TSOP (400 mil)



Reverse bent

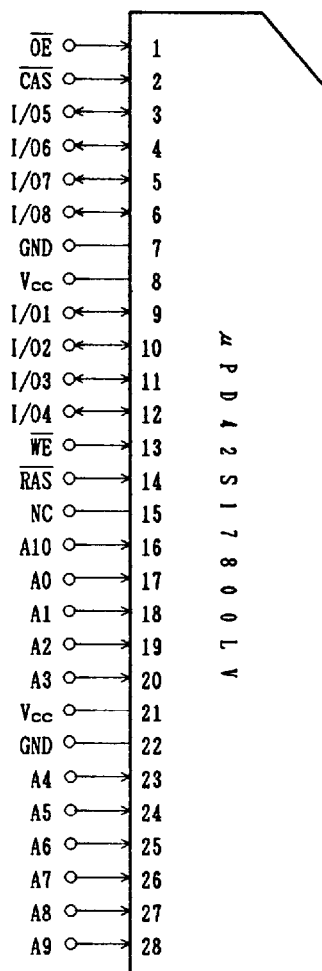
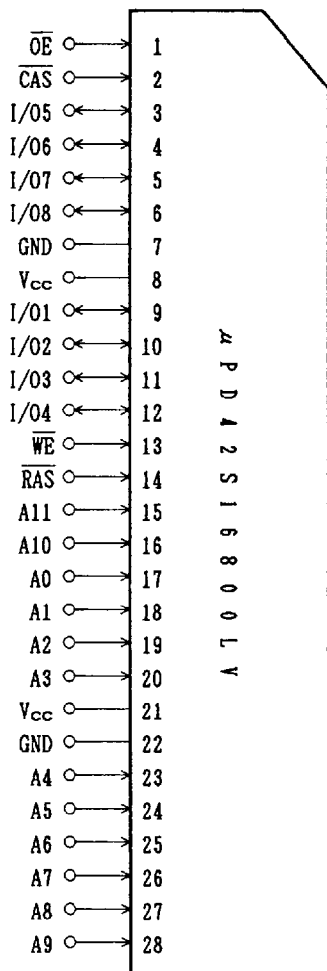


Reverse bent



μ PD42S16800L, 42S17800L

28-pin Plastic ZIP (475 mil)



μPD42S16800L, 42S17800L

ELECTRICAL SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS*

PARAMETER	SYMBOL	TEST CONDITION	RATING	UNIT
Voltage on Any Pin Relative to GND	V_T		-0.5 to +4.6	V
Short Circuit Output Current	I_O		20	mA
Power Dissipation	P_D		1	W
Operating Temperature	T_{opt}		0 to 70	°C
Storage Temperature	T_{stg}		-55 to +125	°C

*COMMENT : Exposing the device to stress above those listed in Absolute Maximum Ratings could cause permanent damage. The device is not meant to be operated under conditions outside the limits described in the operational sections of this specification. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS NOTES:1,2

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}		3.0	3.3	3.6	V
High Level Input Voltage	V_{IH}		2.0		$V_{CC}+0.3$	V
Low Level Input Voltage	V_{IL}		-0.3		0.8	V
Ambient Temperature	T_a		0		70	°C

CAPACITANCE ($T_a=25^\circ\text{C}$, $f=1\text{ MHz}$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Capacitance	C_{I1}	A0 to A10(A11)			5	pF
	C_{I2}	RAS, CAS, WE, OE			7	pF
Data Input/Output Capacitance	C_D	I/01 to I/08			7	pF

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DC CHARACTERISTICS (Recommended Operating Conditions unless Otherwise noted)

【μPD42S16800L】

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	NOTES
Operating Current	I _{CC1}	RAS, CAS Cycling t _{RC} =t _{RC(MIN.)} , I _O =0mA	μPD42S16800L-A60		80	mA	3
			μPD42S16800L-A70		70		
			μPD42S16800L-A80		60		
Standby Current	I _{CC2}	RAS, CAS ≥ V _{IH(MIN.)} , I _O =0mA			0.5	mA	
		RAS, CAS ≥ V _{CC} -0.2V, I _O =0mA			0.1		
Refresh Current (RAS Only Refresh)	I _{CC3}	RAS Cycling, CAS ≥ V _{IH(MIN.)} t _{RC} =t _{RC(MIN.)} , I _O =0mA	μPD42S16800L-A60		80	mA	3
			μPD42S16800L-A70		70		
			μPD42S16800L-A80		60		
Operating Current (Fast Page Mode)	I _{CC4}	CAS Cycling, RAS ≤ V _{IL(MAX.)} t _{PC} =t _{PC(MIN.)} , I _O =0mA	μPD42S16800L-A60		70	mA	3
			μPD42S16800L-A70		60		
			μPD42S16800L-A80		50		
Refresh Current (CAS before RAS Refresh)	I _{CC5}	RAS Cycling, t _{RC} =t _{RC(MIN.)} , I _O =0mA	μPD42S16800L-A60		80	mA	3
			μPD42S16800L-A70		70		
			μPD42S16800L-A80		60		
Battery back-up Current (Standby with CAS before RAS Refresh)	I _{CC6}	Standby: V _{CC} -0.2V ≤ RAS, CAS before RAS Refresh: 4096 Cycle/256 ns RAS, CAS: 0V ≤ V _{IL} ≤ 0.2V V _{CC} -0.2V ≤ V _{IH} ≤ V _{IH MAX.} WE, OE: V _{IH} Address: Don't care Output: OPEN	t _{RAS} ≤ 300ns		140	μA	
			t _{RAS} ≤ 1μs		140		
Self Refresh Current (CAS before RAS Self Refresh)	I _{CC7}	RAS, CAS: 0V ≤ V _{IL} ≤ 0.2V V _{CC} -0.2V ≤ V _{IH} ≤ V _{IH MAX.} I _O =0mA			80	μA	
Input Leakage Current	I _{I(L)}	V _I =0 to 3.6V, all other pins= 0V	-5		5	μA	
Output Leakage Current	I _{O(L)}	D _{OUT} is disabled, V _O =0 to 3.6V	-5		5	μA	
Output High Voltage	V _{OH}	I _O =-2mA	2.4			V	
Output Low Voltage	V _{OL}	I _O =2mA			0.4	V	

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【μPD42S17800L】

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	NOTES
Operating Current	I _{CC1}	R_{AS}, C_{AS} Cycling t_{RC}=t_{RC(MIN.)}, I_O=0mA μPD42S17800L-A60 μPD42S17800L-A70 μPD42S17800L-A80			100 90 80	mA	3
Standby Current	I _{CC2}	R_{AS}, C_{AS} ≥ V_{IH(MIN.)}, I_O=0mA R_{AS}, C_{AS} ≥ V_{CC}-0.2V, I_O=0mA			0.5 0.1	mA	
Refresh Current (RAS Only Refresh)	I _{CC3}	R_{AS} Cycling, C_{AS} ≥ V_{IH(MIN.)} t_{RC}=t_{RC(MIN.)}, I_O=0mA μPD42S17800L-A60 μPD42S17800L-A70 μPD42S17800L-A80			100 90 80	mA	3
Operating Current (Fast Page Mode)	I _{CC4}	C_{AS} Cycling, R_{AS} ≤ V_{IL(MAX.)} t_{PC}=t_{PC(MIN.)}, I_O=0mA μPD42S17800L-A60 μPD42S17800L-A70 μPD42S17800L-A80			70 60 50	mA	3
Refresh Current (CAS before RAS Refresh)	I _{CC5}	R_{AS} Cycling, t_{RC}=t_{RC(MIN.)}, I_O=0mA μPD42S17800L-A60 μPD42S17800L-A70 μPD42S17800L-A80			100 90 80	mA	3
Battery back-up Current (Standby with C _{AS} before RAS Refresh)	I _{CC6}	Standby: V_{CC}-0.2V ≤ R_{AS}, C_{AS} before RAS Refresh: 4096 Cycle/256 ms R_{AS}, C_{AS}: 0V ≤ V_{IL} ≤ 0.2V V_{CC}-0.2V ≤ V_{IH} ≤ V_{IH MAX.} WE, OE: V_{IH} Address: Don't care Output: OPEN t_{RAS} ≤ 300ns t_{RAS} ≤ 1μs			120 120	μA	
Self Refresh Current (C _{AS} before RAS Self Refresh)	I _{CC7}	R_{AS}, C_{AS}: 0V ≤ V_{IL} ≤ 0.2V V_{CC}-0.2V ≤ V_{IH} ≤ V_{IH MAX.}, I_O=0mA			80	μA	
Input Leakage Current	I _{I(L)}	V _I =0 to 3.6V, all other pins= 0V	-5		5	μA	
Output Leakage Current	I _{O(L)}	D _{OUT} is disabled, V _O =0 to 3.6V	-5		5	μA	
Output High Voltage	V _{OH}	I _O =-2mA	2.4			V	
Output Low Voltage	V _{OL}	I _O =2mA			0.4	V	

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AC CHARACTERISTICS

(Recommended Operating Conditions unless Otherwise noted) NOTES: 2,4,5

(1/2)

PARAMETER	SYMBOL	μ PD42S16800L-A80 μ PD42S17800L-A80		μ PD42S16800L-A70 μ PD42S17800L-A70		μ PD42S16800L-A80 μ PD42S17800L-A80		UNIT	NOTES
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.		
Random Read or Write Cycle Time	t _{RC}	110		130		150		ns	6
Read Write Cycle Time	t _{RWC}	160		180		200		ns	6
Fast Page Mode Cycle Time(Read or Write)	t _{PC}	40		45		50		ns	6
Read Modify Write Cycle Time(Fast Page Mode)	t _{PRWC}	85		90		100		ns	6
Access Time from $\overline{\text{RAS}}$	t _{RAC}		60		70		80	ns	7, 8
Access Time from $\overline{\text{CAS}}$ (Falling Edge)	t _{CAC}		15		18		20	ns	7, 8
Access Time from Column Address	t _{AA}		30		35		40	ns	7, 8
Access Time from $\overline{\text{CAS}}$ Precharge	t _{ACP}		35		40		45	ns	7
Access Time from $\overline{\text{OE}}$	t _{OEA}		15		18		20	ns	
$\overline{\text{RAS}}$ to Column Address Delay Time	t _{RAD}	15	30	15	35	17	40	ns	8
$\overline{\text{CAS}}$ -Data Set-up Time	t _{CLZ}	0		0		0		ns	7
$\overline{\text{OE}}$ -Data Set-up Time	t _{OLZ}	0		0		0		ns	7
Output Buffer Turn-off Delay ($\overline{\text{CAS}}$)	t _{OPF}	0	13	0	15	0	15	ns	9
$\overline{\text{OE}}$ Data Delay Time	t _{ORD}	13		15		15		ns	
Output Buffer Turn-off Delay ($\overline{\text{OE}}$)	t _{OBZ}	0	13	0	15	0	15	ns	9
$\overline{\text{OE}}$ Command Hold Time	t _{OBH}	0		0		0		ns	
$\overline{\text{OE}}$ to $\overline{\text{RAS}}$ inactive Set-up Time	t _{OES}	0		0		0		ns	
Transition Time (Rise and Fall)	t _T	3	50	3	50	3	50	ns	
$\overline{\text{RAS}}$ Precharge Time	t _{RP}	40		50		60		ns	
$\overline{\text{RAS}}$ Pulse Width (Random Read, Write Cycle)	t _{RAS}	60	10000	70	10000	80	10000	ns	
$\overline{\text{RAS}}$ Pulse Width (Fast Page Mode)	t _{RASP}	60	125000	70	125000	80	125000	ns	
$\overline{\text{RAS}}$ Hold Time	t _{RSH}	15		18		20		ns	
$\overline{\text{CAS}}$ Pulse Width	t _{CAS}	15	10000	18	10000	20	10000	ns	
$\overline{\text{CAS}}$ Hold Time	t _{CSH}	60		70		80		ns	
$\overline{\text{RAS}}$ to $\overline{\text{CAS}}$ Delay Time	t _{RCD}	20	45	20	50	25	60	ns	8
$\overline{\text{CAS}}$ to $\overline{\text{RAS}}$ Precharge Time	t _{CRP}	5		5		5		ns	10
$\overline{\text{CAS}}$ Precharge Time	t _{CPN}	10		10		10		ns	
$\overline{\text{CAS}}$ Precharge Time (Fast Page Mode)	t _{CP}	10		10		10		ns	
$\overline{\text{RAS}}$ Precharge $\overline{\text{CAS}}$ Hold Time	t _{RPC}	5		5		5		ns	
$\overline{\text{RAS}}$ Hold Time from $\overline{\text{CAS}}$ Precharge	t _{RHCP}	35		40		45		ns	
Row Address Set-up Time	t _{ASR}	0		0		0		ns	
Row Address Hold Time	t _{RAH}	10		10		12		ns	

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PARAMETER	SYMBOL	μPD42S16800L-A60 μPD42S17800L-A60	μPD42S16800L-A70 μPD42S17800L-A70	μPD42S16800L-A80 μPD42S17800L-A80	UNIT	NOTES
		MIN.	MAX.	MIN.	MAX.	
Column Address Set-up Time	t _{ASC}	0		0		ns
Column Address Hold Time	t _{CAH}	15		15		ns
Column Address Lead Time Referenced to RAS	t _{RAL}	30		35		ns
Read Command Set-up Time	t _{RCS}	0		0		ns
Read Command Hold Time Referenced to RAS	t _{RRH}	0		0		ns 11
Read Command Hold Time Referenced to CAS	t _{RCH}	0		0		ns 11
Write Command Hold Time Referenced to CAS	t _{WCH}	10		10	15	ns 12
Write Command Pulse Width	t _{WP}	10		10	15	ns 12
Data-in Set-up Time	t _{DS}	0		0		ns 13
Data-in Hold Time	t _{DH}	10		15	15	ns 13
WE Command Set-up Time	t _{WCS}	0		0		ns 14
CAS to WE Delay	t _{CWD}	38		43	45	ns 15
RAS to WE Delay	t _{RWD}	83		95	105	ns 15
Column Address to WE Delay Time	t _{AWD}	53		60	65	ns 15
Write Command to RAS Lead Time	t _{RWL}	20		20	20	ns
Write Command to CAS Lead Time	t _{CWL}	15		15	15	ns
CAS Set-up Time for CBR Refresh	t _{CSR}	5		5	5	ns
CAS Hold Time for CBR Refresh	t _{CHR}	10		10	10	ns
RAS Pulse Width (Self Refresh Cycle)	t _{RASS}	100		100	100	μs
RAS Precharge Time (Self Refresh Cycle)	t _{RPS}	110		130	150	ns
CAS Hold Time (Self Refresh Cycle)	t _{CHS}	-50		-50	-50	ns
WE Set-up Time	t _{WSR}	10		10	10	ns
WE Hold Time	t _{WHR}	15		15	15	ns
Refresh Period	t _{REF}		256		256	ms 16

NOTES:

1. All voltages referenced to GND.
2. An initial pause of 100 μs required after power-on followed by 8 refresh ($\overline{\text{RAS}}$ only refresh or $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ refresh) cycles before proper device operation is achieved.
3. I_{CC1} , I_{CC2} , I_{CC4} and I_{CC6} depend on output loading and cycle rates. Specified values are obtained with the output open. In addition to this, I_{CC3} is measured on condition that column addresses in $\overline{\text{RAS}}$ only cycle are held high or low level and I_{CC4} is measured on condition that column addresses in fast page mode are changed only one time during $t_{PC}(\text{MIN.})$.
4. AC measurements assume $t_T=5\text{ns}$
5. $V_{IH}(\text{MIN.})$ and $V_{IL}(\text{MAX.})$ are reference levels for measuring timing of input signals. Transition times are measured between V_{IH} and V_{IL} .
6. The minimum specifications are used only to indicate cycle time at which proper operation over the full temperature range ($T_a=0$ to 70°C) is assured.
7. Load = 1 TTL loads and 100pF ($V_{OH}=2.0\text{V}$, $V_{OL}=0.8\text{V}$)
8. The access time is determined by $\overline{\text{RAS}}$ access time t_{RAC} , address access time t_{AA} , and $\overline{\text{CAS}}$ address time t_{CAC} . The relationship between these access time and t_{RCD} , t_{RAD} is as follows.

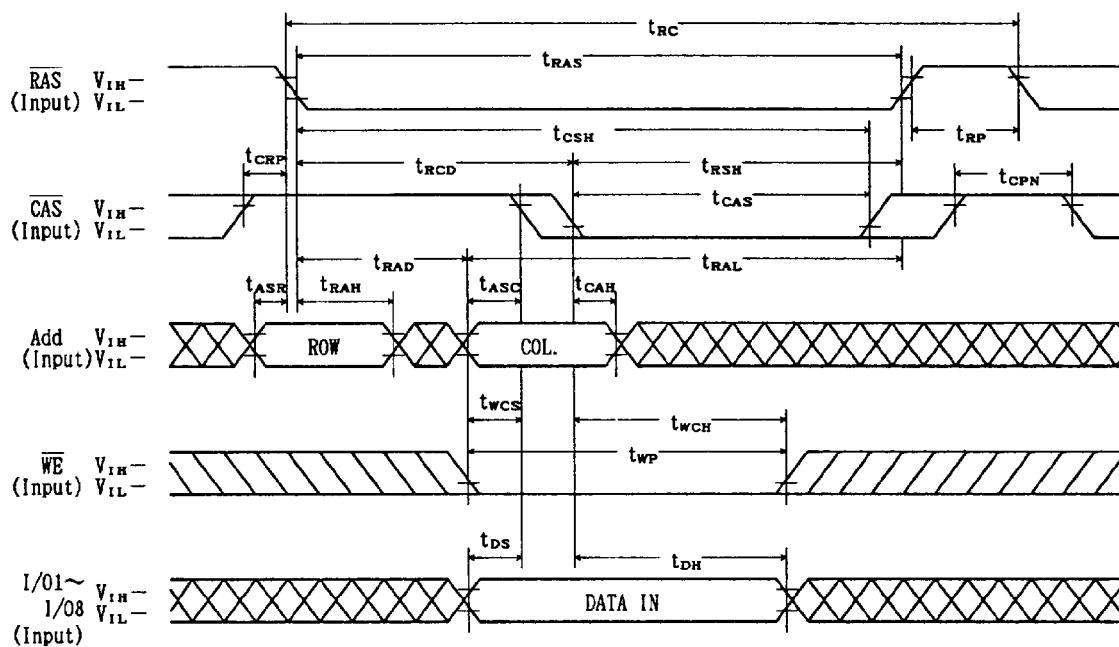
CONDITION	ACCESS TIME
$t_{RAD} \leq t_{RAD}(\text{MAX.})$ and $t_{RCD} \leq t_{RCD}(\text{MAX.})$	$t_{RAC}(\text{MAX.})$
$t_{RAD} \geq t_{RAD}(\text{MAX.})$	$t_{AA}(\text{MAX.})$
$t_{RCD} \geq t_{RCD}(\text{MAX.})$	$t_{CAC}(\text{MAX.})$

9. $t_{OFF}(\text{MAX.})$ and $t_{OEZ}(\text{MAX.})$ defines the time at which the output achieves the open circuit condition and is not referenced to V_{OH} or V_{OL} .
10. t_{CRP} requirement should be applicable for $\overline{\text{RAS}}$ / $\overline{\text{CAS}}$ cycles preceded by any cycles.
11. Either t_{RRH} or t_{RCH} must be satisfied for a read cycle.
12. t_{WP} is applicable for late write cycle. If the cycle is early write, it should be satisfied value of t_{WCH} .
13. These parameters are referenced to $\overline{\text{CAS}}$ leading edge in early write cycles and to $\overline{\text{WE}}$ leading edge in late write or read-modify-write cycles.
14. If $t_{WCS} \geq t_{WCS}(\text{MIN.})$ the cycle is an early write cycle and the data output will remain open circuit throughout the entire cycle.
15. If $t_{CWD} \geq t_{CWD}(\text{MIN.})$, $t_{RWD} \geq t_{RWD}(\text{MIN.})$, $t_{AWD} \geq t_{AWD}(\text{MIN.})$ the cycle is a read-write and the data output will contain data read from the selected cell. If neither of the above conditions are met, the condition of the data out (at access time and until $\overline{\text{CAS}}$ goes back to V_{IH}) is indeterminate.
16. How to enter into $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ self refresh mode.
 - In case of using distributed $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ refresh
Refresh 2048 or 4096 times during a 256ms (Before set into the $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ self refresh mode, and after reset).
 - In case of using burst $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ refresh
Refresh 2048 times during a 32ms ($\mu\text{PD42S17800L}$) or 4096 times during a 64ms ($\mu\text{PD42S16800L}$) (Before set into the $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ self refresh mode, and after reset).
 - In case of use $\overline{\text{RAS}}$ only refresh
Refresh against all refresh address during 32ms ($\mu\text{PD42S17800L}$) or 64ms ($\mu\text{PD42S16800L}$) (Before set into the $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ self refresh mode, and after reset).

READ CYCLE

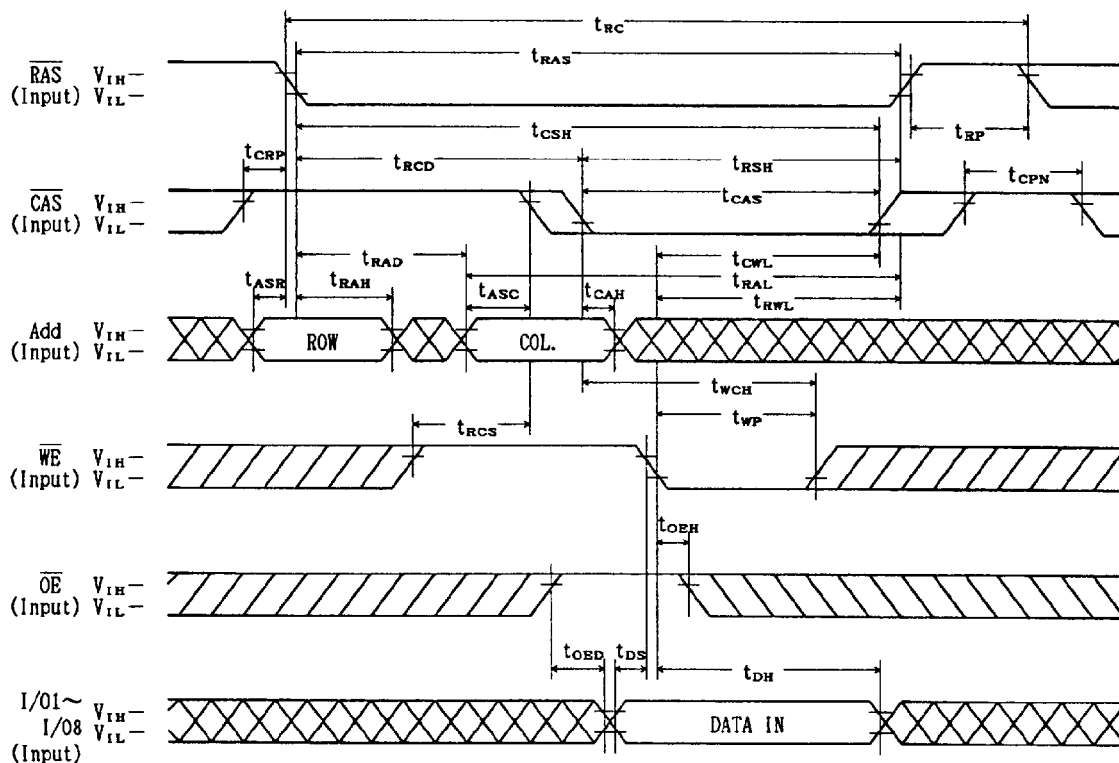


EARLY WRITE CYCLE



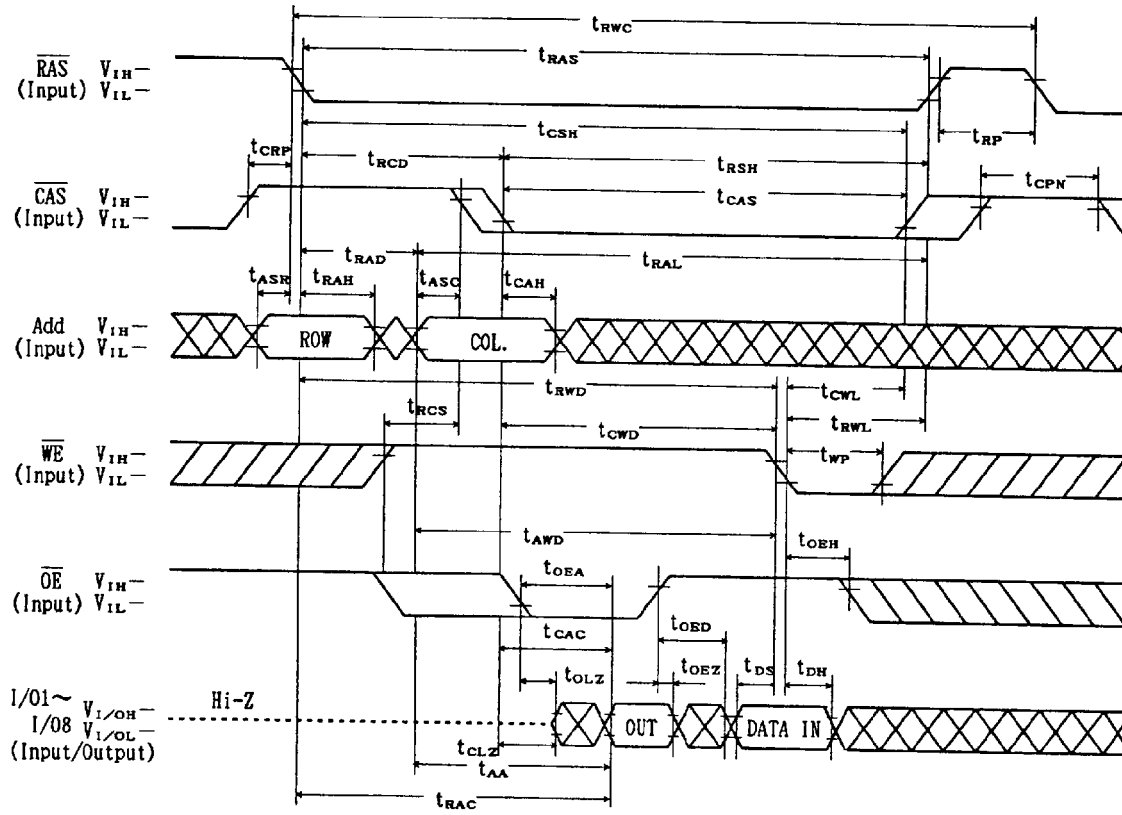
Note: $\overline{OE}$ = Don't care

LATE WRITE CYCLE

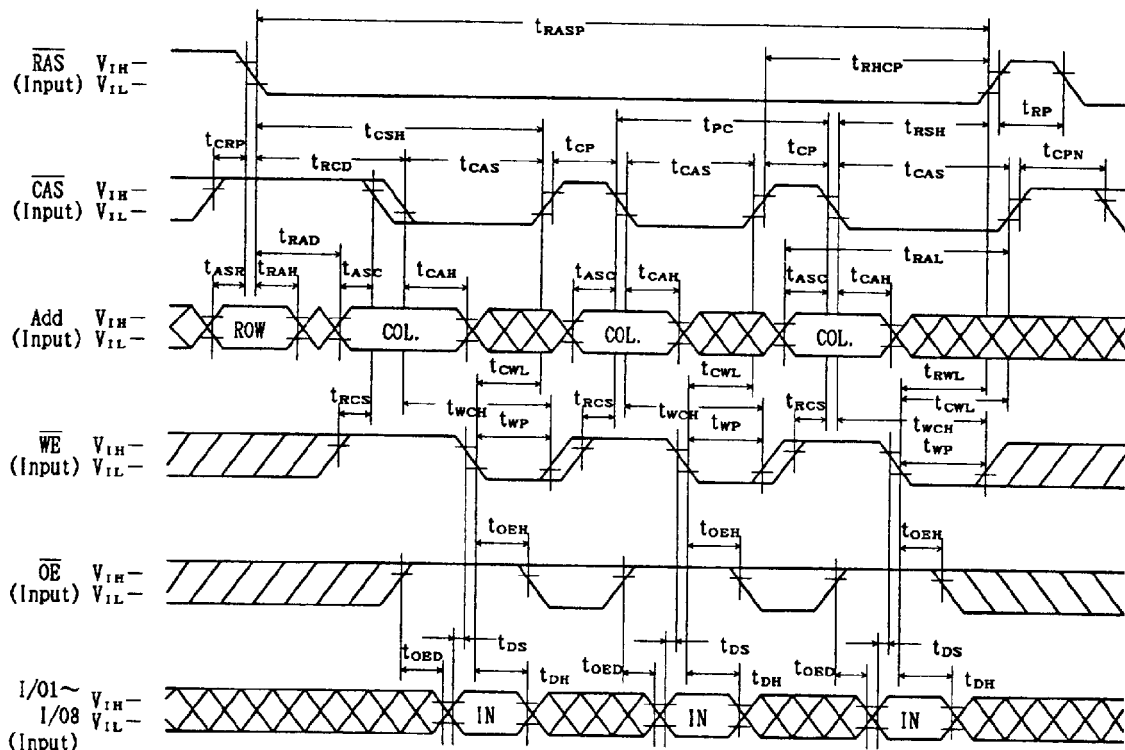


μ PD42S16800L, 42S17800L

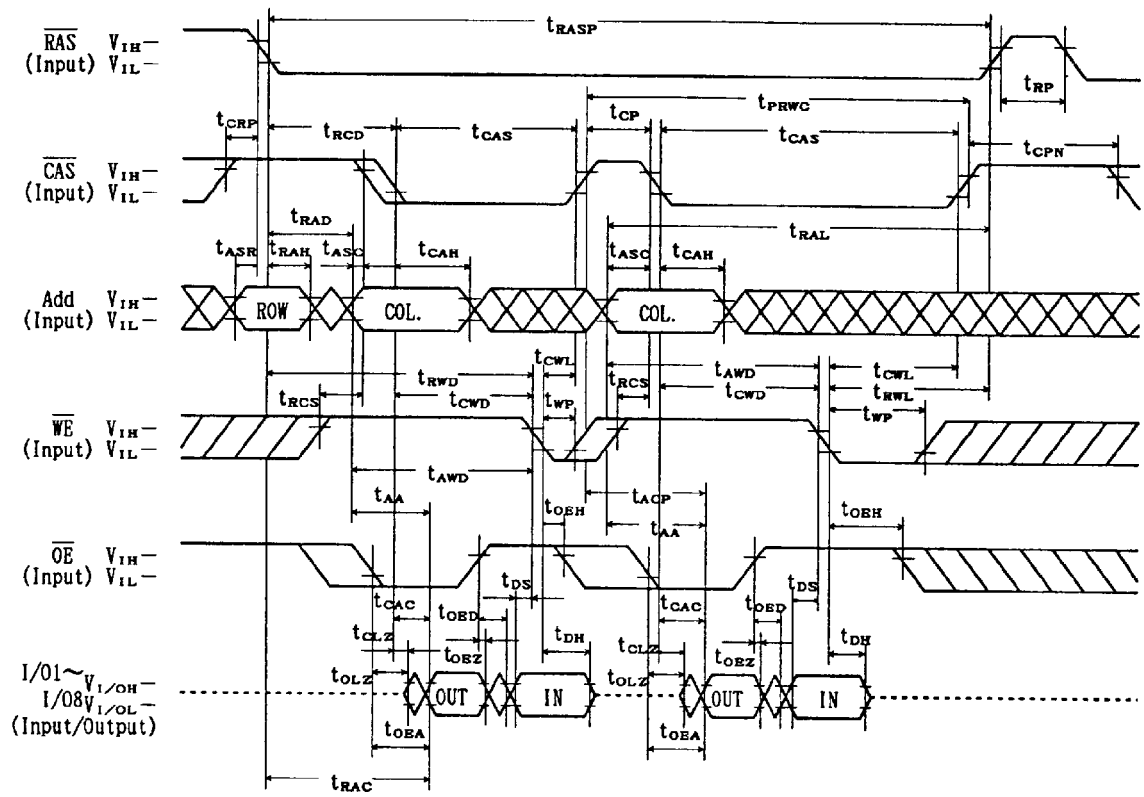
READ MODIFY WRITE CYCLE



Note : $\overline{OE}$ = Don't care

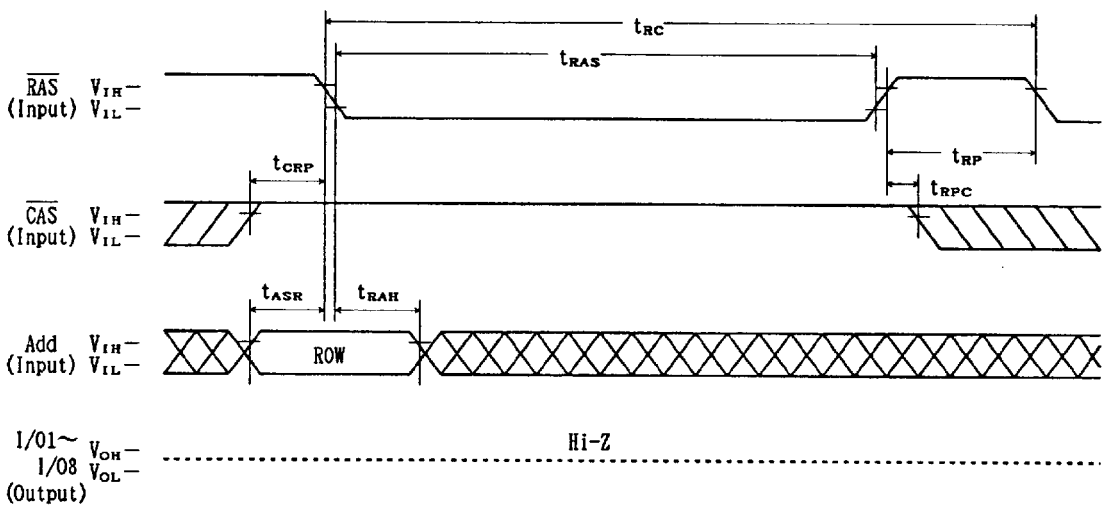


FAST PAGE MODE READ MODIFY WRITE CYCLE



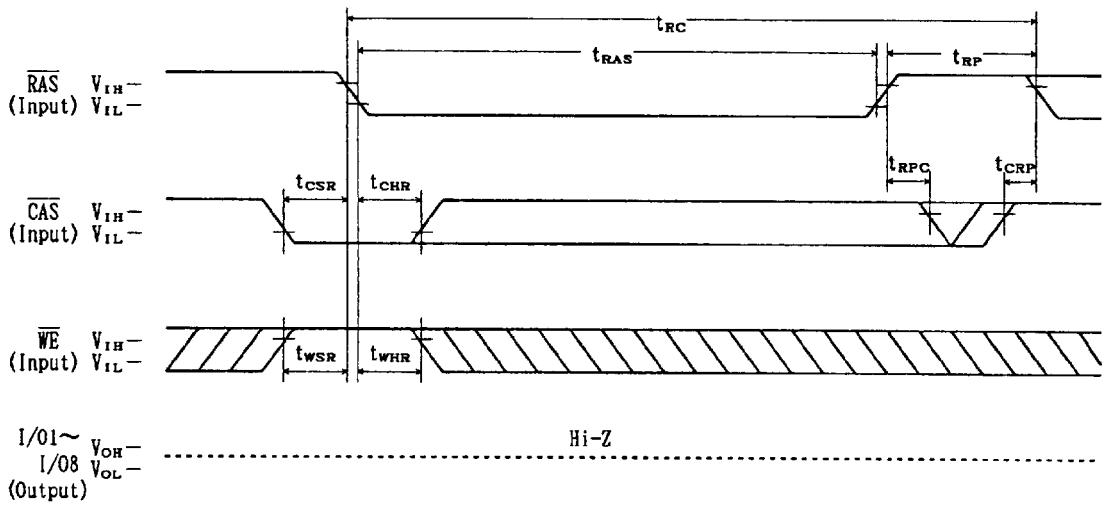
μ PD42S16800L, 42S17800L

RAS ONLY REFRESH CYCLE



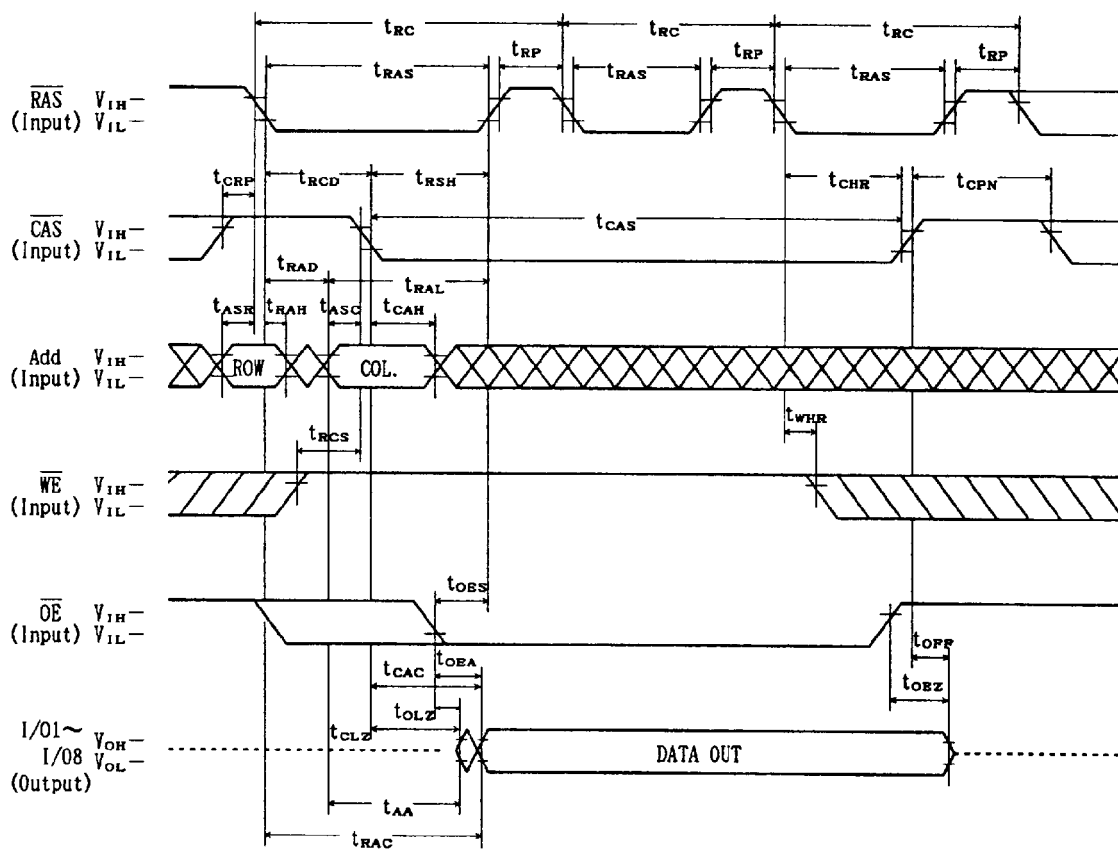
Note: $\overline{WE}$, $\overline{OE}$ = Don't care

CAS BEFORE RAS REFRESH CYCLE

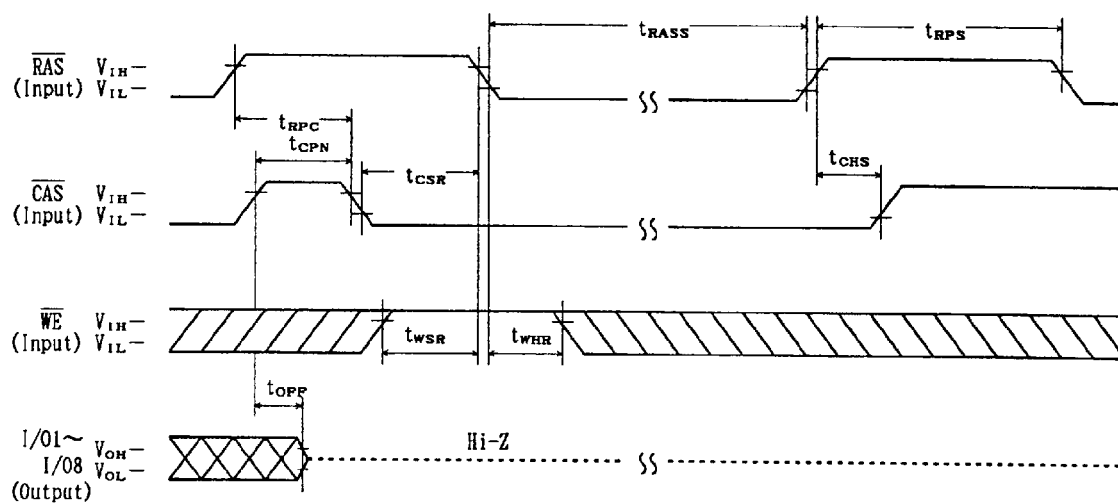


Note: $\overline{OE}$ = Don't care

CAS BEFORE RAS HIDDEN REFRESH CYCLE



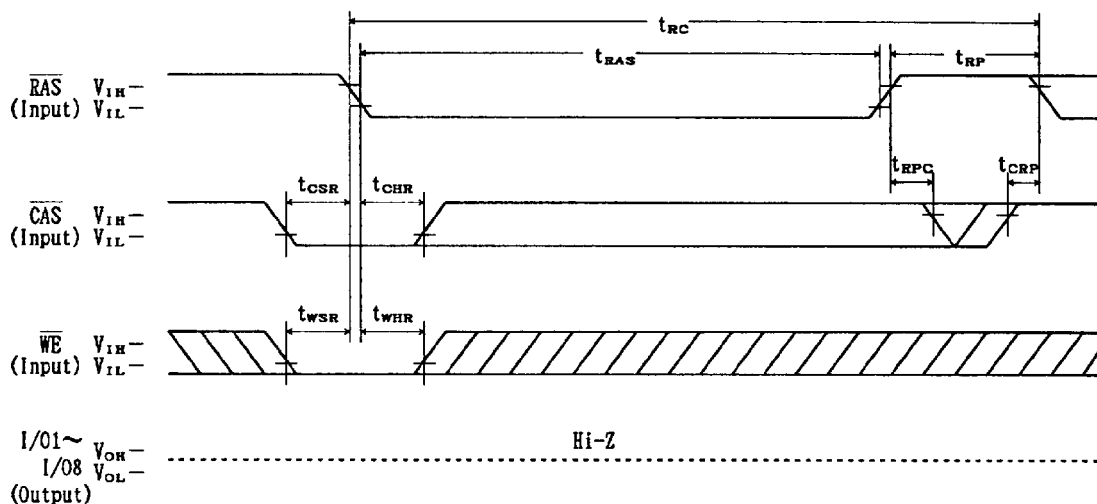
CAS BEFORE RAS SELF REFRESH CYCLE



μPD42S16800L, 42S17800L

TEST MODE SET CYCLE

($\overline{\text{WE}}$ AND $\overline{\text{CAS}}$ BEFORE $\overline{\text{RAS}}$ REFRESH CYCLE)



TEST MODE

TEST MODE is fast test function. On using this mode, test time is reduced to 1/2.

In this TEST MODE, internal organization is 1M words by 16-bit apparently. The input levels of the $\overline{\text{CAS}}$ input A0 are Don't care.

1. How to enter into TEST MODE

Through TEST MODE SET CYCLE ($\overline{\text{WE}}$ and $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ refresh cycle), the device is entered into TEST MODE.

2. Write/Read in TEST MODE

Write data "1" or "0" through I/O1 to I/O8 by controlling address except for above-mentioned address. Each input data through each I/O (I/O1, I/O2, I/O3, I/O4, I/O5, I/O6, I/O7, I/O8) write 2 bits at once. And read through I/O1 to I/O8 to check written data.

In case of writing each 2 bits rightly, each I/O data is "1". But wrong, each I/O data is "0".

3. Refresh in TEST MODE

Use normal read cycle or $\overline{\text{WE}}$ and $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ refresh cycle.

4. How to reset TEST MODE

Through $\overline{\text{RAS}}$ only refresh cycle or $\overline{\text{CAS}}$ before $\overline{\text{RAS}}$ refresh cycle, the device is reset TEST MODE.

3. PACKAGE DRAWINGS

26 PIN PLASTIC SOJ (300mil)	24 Leads	495
28 PIN PLASTIC SOJ (400mil)	24 Leads	496
28 PIN PLASTIC SOJ (400mil)	28 Leads	497
32 PIN PLASTIC SOJ (400mil)		498
42 PIN PLASTIC SOJ (400mil)		499
26 PIN PLASTIC TSOP (300mil) *	24 Leads	500
26 PIN PLASTIC TSOP (300mil) *	24 Leads Reverse bent	501
28 PIN PLASTIC TSOP (400mil)	24 Leads	502
28 PIN PLASTIC TSOP (400mil)	24 Leads Reverse bent	503
28 PIN PLASTIC TSOP (400mil)	28 Leads	504
28 PIN PLASTIC TSOP (400mil)	28 Leads Reverse bent	505
32 PIN PLASTIC TSOP (400mil)		506
32 PIN PLASTIC TSOP (400mil)	Reverse bent	507
50 PIN PLASTIC TSOP (400mil)	44 Leads	508
50 PIN PLASTIC TSOP (400mil)	44 Leads Reverse bent	509
24 PIN PLASTIC ZIP (475mil)		510
28 PIN PLASTIC ZIP (475mil)		511
32 PIN PLASTIC ZIP (475mil)		512

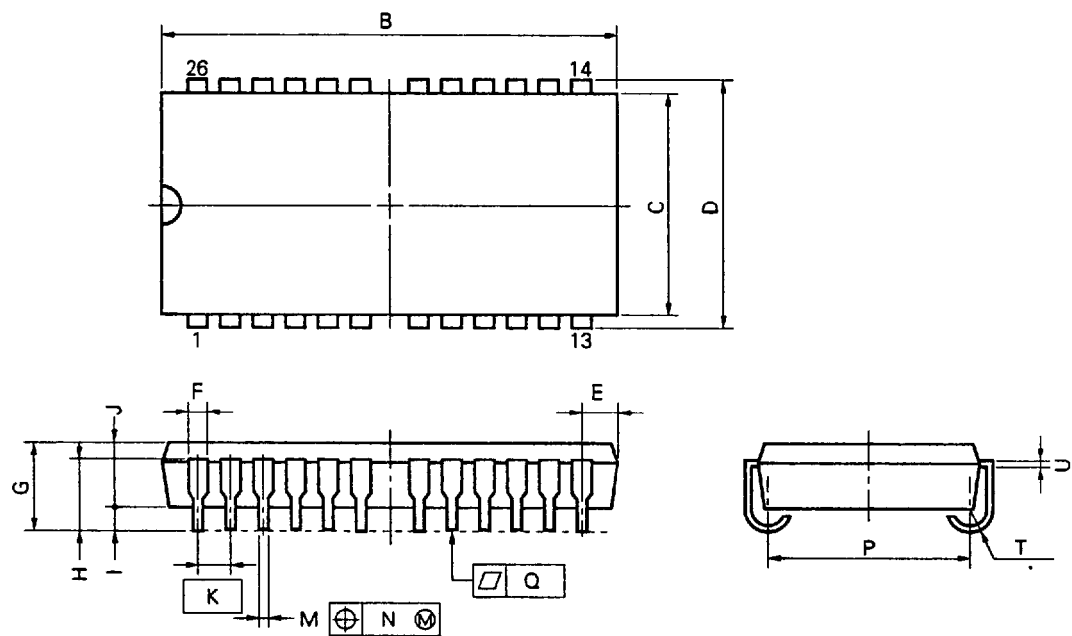
* : under development

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494

26 PIN PLASTIC SOJ (300mil)
24 Leads

NEC Cord:S26LA-300A

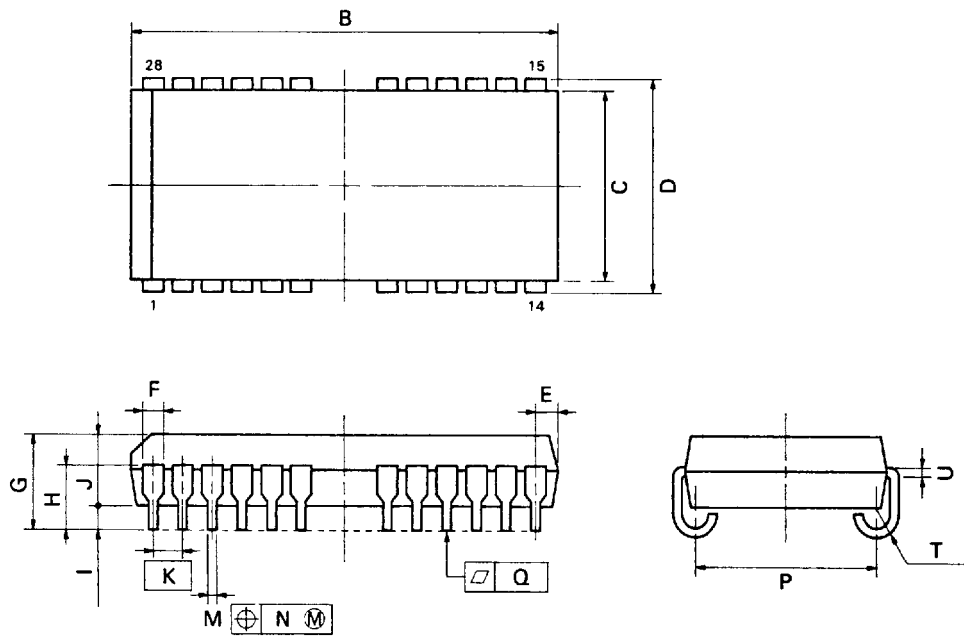


NOTE
Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

S26LA-300A		
ITEM	MILLIMETERS	INCHES
B	17.1 ^{+0.25} _{-0.05}	0.673 ^{+0.010} _{-0.002}
C	7.62	0.300
D	8.47±0.2	0.333 ^{+0.009} _{-0.008}
E	1.03±0.15	0.041 ^{+0.006} _{-0.007}
F	0.74	0.029
G	3.5±0.2	0.138±0.008
H	2.545±0.2	0.100±0.008
I	0.8 MIN.	0.031 MIN.
J	2.6	0.102
K	1.27 (T.P.)	0.050 (T.P.)
M	0.40±0.10	0.016 ^{+0.004} _{-0.005}
N	0.12	0.005
P	6.73±0.20	0.265±0.008
Q	0.10	0.004
T	R 0.85	R 0.033
U	0.20 ^{+0.10} _{-0.05}	0.008 ^{+0.004} _{-0.002}

28 PIN PLASTIC SOJ (400mil)
24 Leads

NEC Cord:P28LE-400A



P28LE-400A

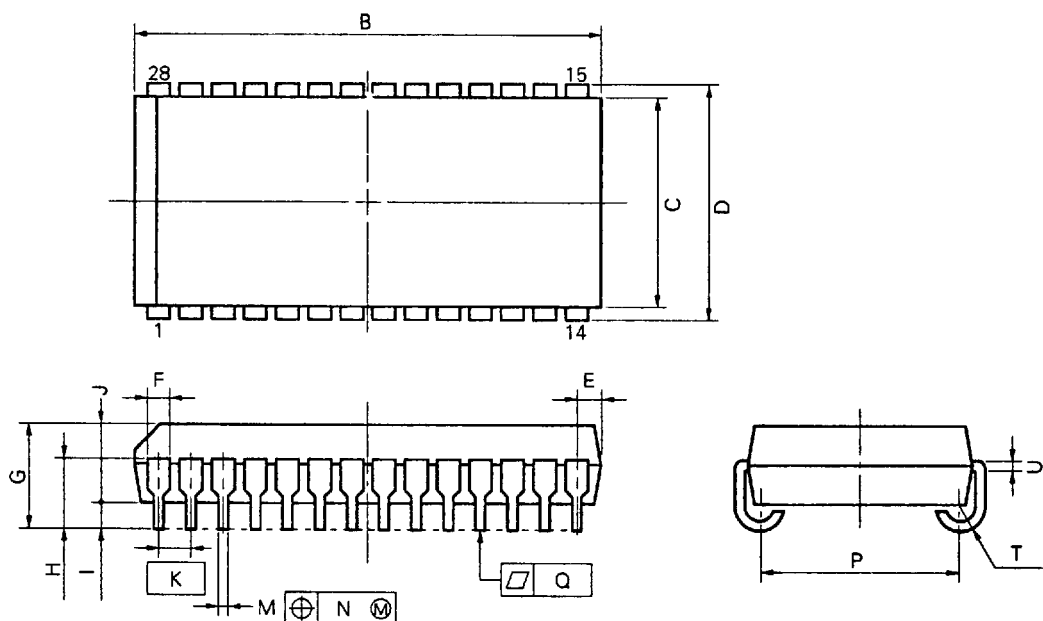
NOTE

Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
B	18.67 ^{+0.2} _{-0.35}	0.735 ^{+0.008} _{-0.013}
C	10.16	0.400
D	11.18 ^{±0.2}	0.440 ^{+0.008} _{-0.009}
E	1.08 ^{+0.15}	0.043 ^{+0.006} _{-0.007}
F	0.7	0.028
G	3.5 ^{±0.2}	0.138 ^{+0.008} _{-0.007}
H	2.4 ^{±0.2}	0.094 ^{+0.008} _{-0.008}
I	0.8 MIN.	0.031 MIN.
J	2.6	0.102
K	1.27 (T.P.)	0.050 (T.P.)
M	0.40 ^{±0.10}	0.016 ^{+0.004} _{-0.005}
N	0.12	0.005
P	9.40 ^{±0.20}	0.370 ^{+0.008} _{-0.007}
Q	0.15	0.006
T	R0.85	R0.033
U	0.20 ^{+0.10} _{-0.05}	0.008 ^{+0.003} _{-0.002}

28 PIN PLASTIC SOJ (400mil)
28 Leads

NEC Cord:P28LE-400A1



NOTE

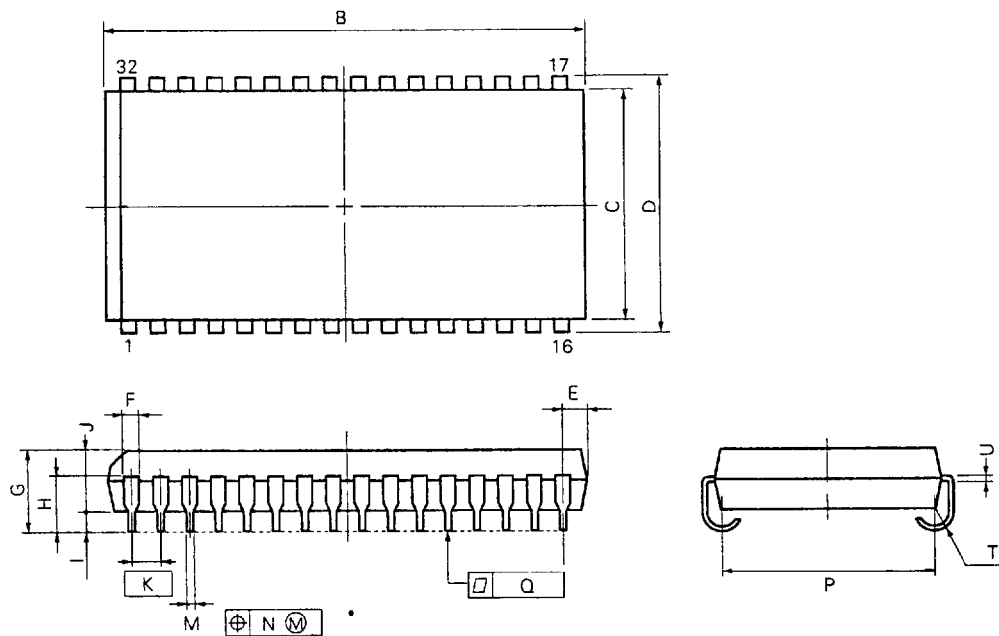
Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

P28LE-400A1

ITEM	MILLIMETERS	INCHES
B	18.67 ^{+0.2} _{-0.35}	0.735 ^{+0.008} _{-0.013}
C	10.16	0.400
D	11.18±0.2	0.440 ^{+0.008} _{-0.007}
E	1.08±0.15	0.043 ^{+0.006} _{-0.007}
F	0.74	0.029
G	3.5±0.2	0.138 ^{+0.008} _{-0.007}
H	2.545±0.2	0.100±0.008
I	0.8 MIN	0.031 MIN.
J	2.6	0.102
K	1.27 (T.P.)	0.050 (T.P.)
M	0.40±0.10	0.016 ^{+0.004} _{-0.005}
N	0.12	0.005
P	9.40±0.20	0.370 ^{+0.008} _{-0.007}
Q	0.10	0.004
T	R 0.85	R 0.033
U	0.20 ^{+0.10} _{-0.05}	0.008 ^{+0.004} _{-0.002}

32 PIN PLASTIC SOJ (400mil)

NEC Cord:P32LE-400A



NOTE

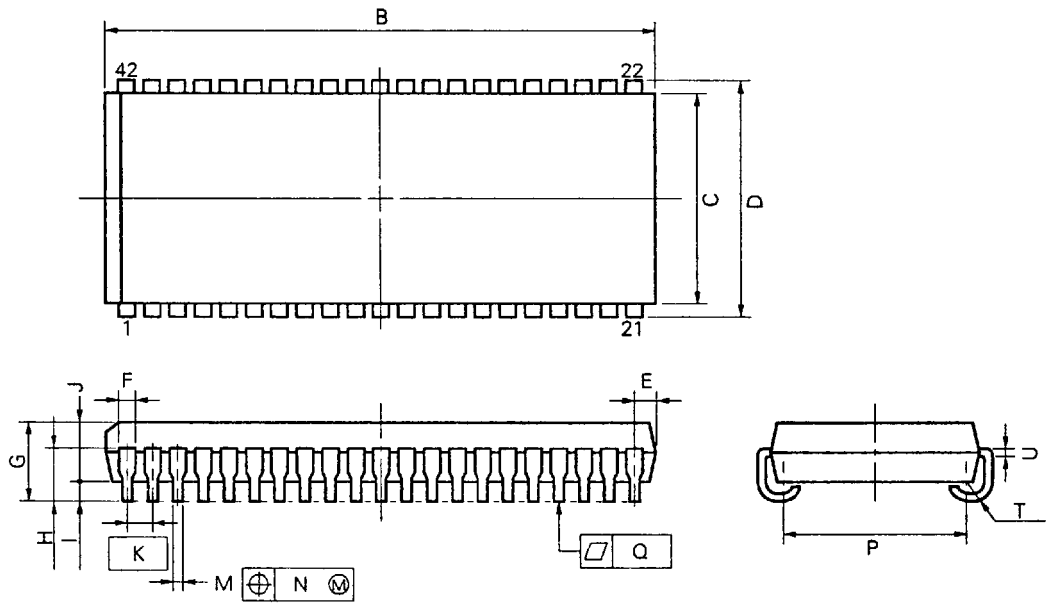
Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition

P32LE-400A

ITEM	MILLIMETERS	INCHES
B	21.06±0.2	0.829±0.008
C	10.16	0.400
D	11.18±0.2	0.440±0.008
E	1.005±0.1	0.040 ^{+0.004} _{-0.005}
F	0.74	0.029
G	3.5±0.2	0.138±0.008
H	2.545±0.2	0.100±0.008
I	0.8 MIN	0.031 MIN
J	2.6	0.102
K	1.27 (T.P.)	0.050 (T.P.)
M	0.40±0.10	0.016 ^{+0.004} _{-0.005}
N	0.12	0.005
P	9.4±0.20	0.370±0.008
Q	0.1	0.004
T	R 0.85	R 0.033
U	0.20 ^{+0.10} _{-0.02}	0.008 ^{+0.004} _{-0.002}

42 PIN PLASTIC SOJ (400mil)

NEC Cord:P42LE-400A



NOTE

Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

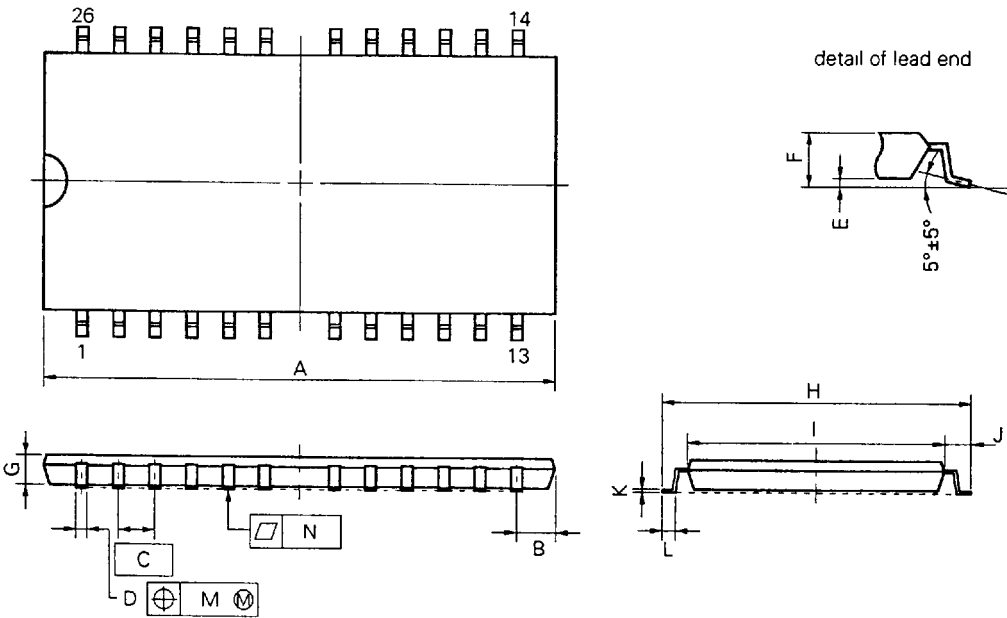
P42LE-400A

ITEM	MILLIMETERS	INCHES
B	27.56 ^{+0.2} _{-0.35}	1.085 ^{+0.008} _{-0.014}
C	10.16	0.400
D	11.18±0.2	0.440±0.008
E	1.08±0.15	0.043 ^{+0.006} _{-0.007}
F	0.74	0.029
G	3.5±0.2	0.138±0.008
H	2.545±0.2	0.100±0.008
I	0.8 MIN.	0.031 MIN.
J	2.6	0.102
K	1.27 (T.P.)	0.050 (T.P.)
M	0.40±0.10	0.016 ^{+0.004} _{-0.005}
N	0.12	0.005
P	9.4±0.20	0.370±0.008
Q	0.10	0.004
T	R 0.85	R 0.033
U	0.20 ^{+0.10} _{-0.05}	0.008 ^{+0.004} _{-0.002}

26 PIN PLASTIC TSOP (300mil) *
 24 Leads

* : under development

NEC Cord:S26G3-50-7JD



NOTE

Each lead centerline is located within 0.21 mm (0.009 inch) of its true position (T.P) at maximum material condition.

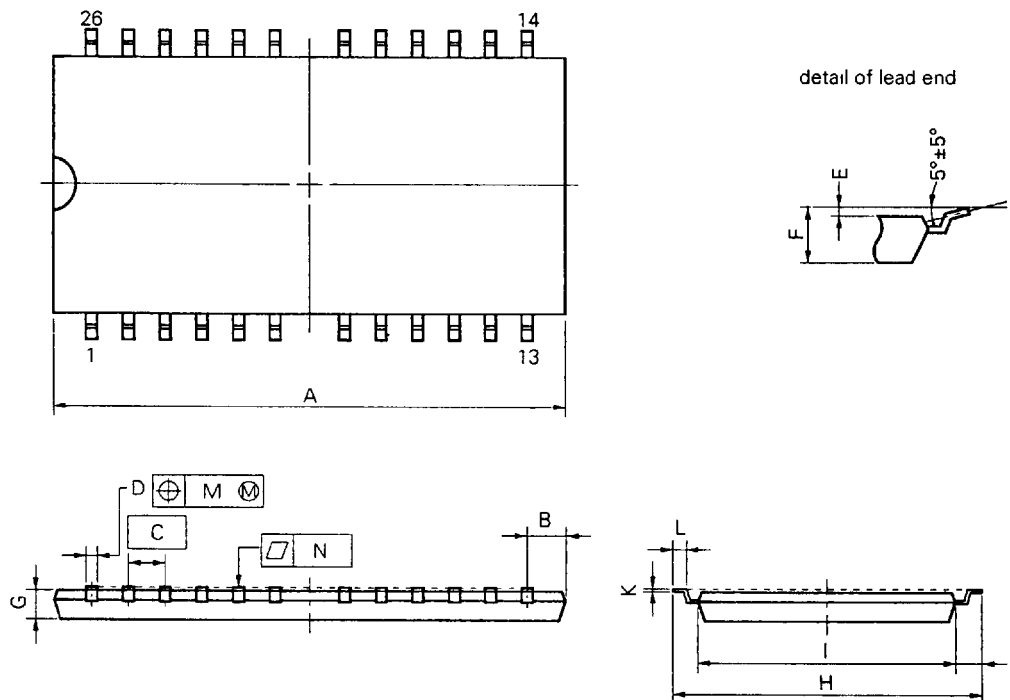
S26G3-50-7JD		
ITEM	MILLIMETERS	INCHES
A	17.40 MAX.	0.685 MAX.
B	1.06 MAX.	0.042 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40±0.10	0.016 ^{+0.004} _{-0.005}
E	0.05±0.05	0.002±0.002
F	1.1 MAX.	0.044 MAX.
G	0.97	0.038
H	9.22±0.2	0.363±0.008
I	7.62±0.1	0.300±0.004
J	0.8±0.2	0.031 ^{+0.009} _{-0.008}
K	0.125 ^{+0.10} _{-0.05}	0.005 ^{+0.004} _{-0.002}
L	0.5±0.1	0.020 ^{+0.004} _{-0.005}
M	0.21	0.009
N	0.10	0.004

26 PIN PLASTIC TSOP (300mil) *

24 Leads Reverse bent

* : under development

NEC Cord:S26G3-50-7KD



NOTE

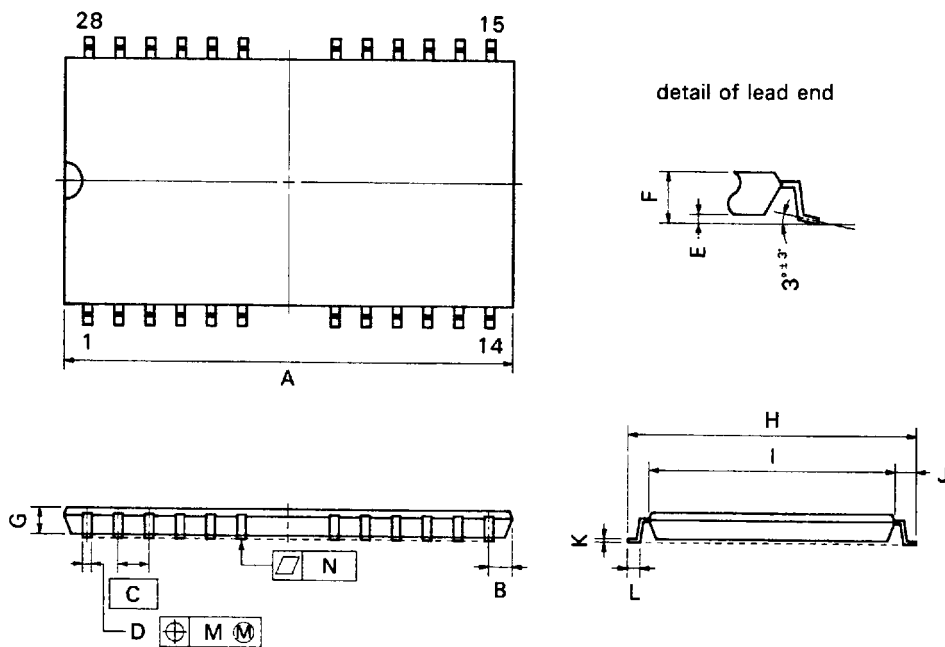
Each lead centerline is located within 0.21 mm (0.009 inch) of its true position (T.P.) at maximum material condition

S26G3-50-7KD

ITEM	MILLIMETERS	INCHES
A	17.40 MAX.	0.685 MAX.
B	1.06 MAX.	0.042 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40±0.10	0.016 ^{+0.004} _{-0.005}
E	0.05±0.05	0.002±0.002
F	1.1 MAX.	0.044 MAX.
G	0.97	0.038
H	9.22±0.2	0.363±0.008
I	7.62±0.1	0.300±0.004
J	0.8±0.2	0.031 ^{+0.009} _{-0.008}
K	0.125 ^{+0.10} _{-0.05}	0.005 ^{+0.004} _{-0.002}
L	0.5±0.1	0.020 ^{+0.004} _{-0.005}
M	0.21	0.009
N	0.10	0.004

28 PIN PLASTIC TSOP (400mil)
24 Leads

NEC Cord:S28G5-50-7JD1



S28G5-50-7JD1

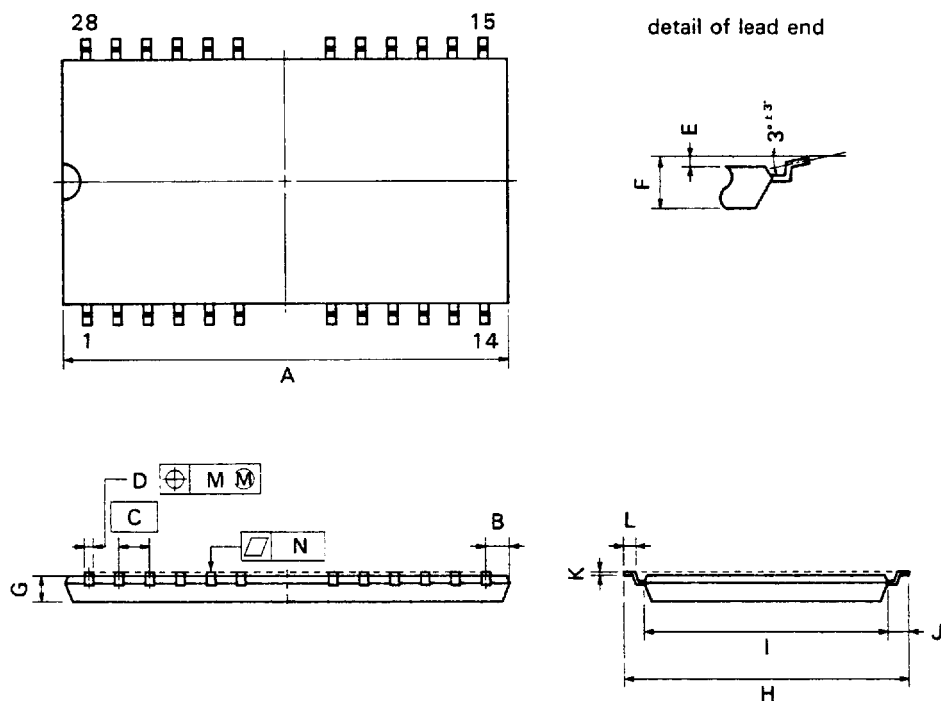
NOTE

Each lead centerline is located within 0.21 mm (0.009 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	18.81 MAX.	0.741 MAX.
B	1.15 MAX.	0.046 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40 ^{+0.10} _{-0.05}	0.016 ^{+0.004} _{-0.002}
E	0.05 ^{+0.05} _{-0.02}	0.002 ^{+0.002} _{-0.001}
F	1.1 MAX.	0.044 MAX.
G	0.97	0.038
H	11.76 ^{+0.2} _{-0.1}	0.463 ^{+0.008} _{-0.004}
I	10.16 ^{+0.1} _{-0.05}	0.400 ^{+0.004} _{-0.002}
J	0.8 ^{+0.2} _{-0.1}	0.031 ^{+0.008} _{-0.004}
K	0.125 ^{+0.10} _{-0.05}	0.005 ^{+0.004} _{-0.002}
L	0.5 ^{+0.1} _{-0.05}	0.020 ^{+0.004} _{-0.002}
M	0.21	0.009
N	0.10	0.004

28 PIN PLASTIC TSOP (400mil)
24 Leads Reverse bent

NEC Cord:S28G5-50-7KD1



NOTE

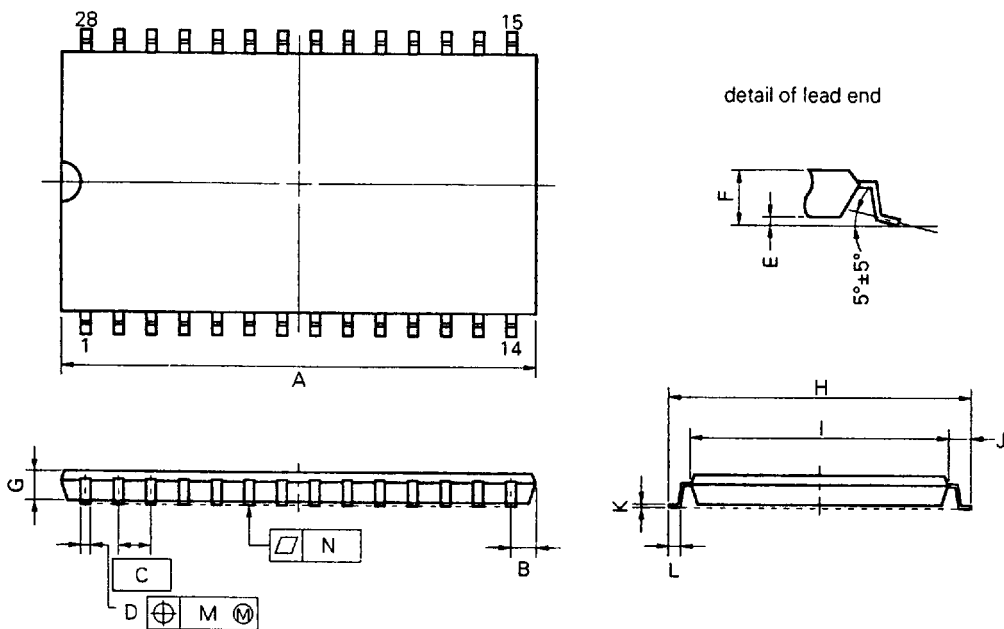
Each lead centerline is located within 0.21 mm (0.009 inch) of its true position (T.P.) at maximum material condition.

S28G5-50-7KD1

ITEM	MILLIMETERS	INCHES
A	18.81 MAX.	0.741 MAX.
B	1.15 MAX.	0.046 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40 $\pm$ 0.10	0.016 $\pm$ 0.004
E	0.05 $\pm$ 0.05	0.002 $\pm$ 0.002
F	1.1 MAX.	0.044 MAX.
G	0.97	0.038
H	11.76 $\pm$ 0.2	0.463 $\pm$ 0.008
I	10.16 $\pm$ 0.1	0.400 $\pm$ 0.004
J	0.8 $\pm$ 0.2	0.031 $\pm$ 0.008
K	0.125 $\pm$ 0.02	0.005 $\pm$ 0.002
L	0.5 $\pm$ 0.1	0.020 $\pm$ 0.004
M	0.21	0.009
N	0.10	0.004

28 PIN PLASTIC TSOP (400mil)
28 Leads

NEC Cord:S28G5-50-7JD2



NOTE

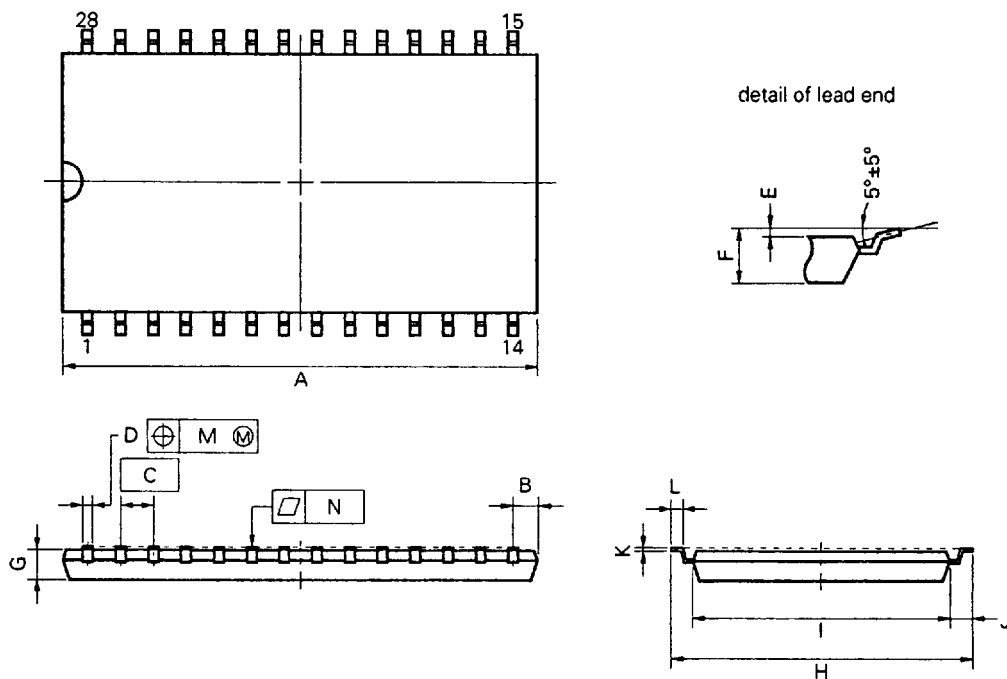
Each lead centerline is located within 0.21 mm (0.009 inch) of its true position (T.P.) at maximum material condition.

S28G5-50-7JD2

ITEM	MILLIMETERS	INCHES
A	18.81 MAX.	0.741 MAX.
B	1.15 MAX.	0.046 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40±0.10	0.016 ^{+0.004} _{-0.005}
E	0.05±0.05	0.002±0.002
F	1.1 MAX.	0.044 MAX.
G	0.97	0.038
H	11.76±0.2	0.463±0.008
I	10.16±0.1	0.400±0.004
J	0.8±0.2	0.031 ^{+0.009} _{-0.008}
K	0.125 ^{+0.10} _{-0.05}	0.005 ^{+0.004} _{-0.002}
L	0.5±0.15	0.020 ^{+0.008} _{-0.007}
M	0.21	0.009
N	0.10	0.004

28 PIN PLASTIC TSOP (400mil)
28 Leads Reverse bent

NEC Cord:S28G5-50-7KD2



NOTE

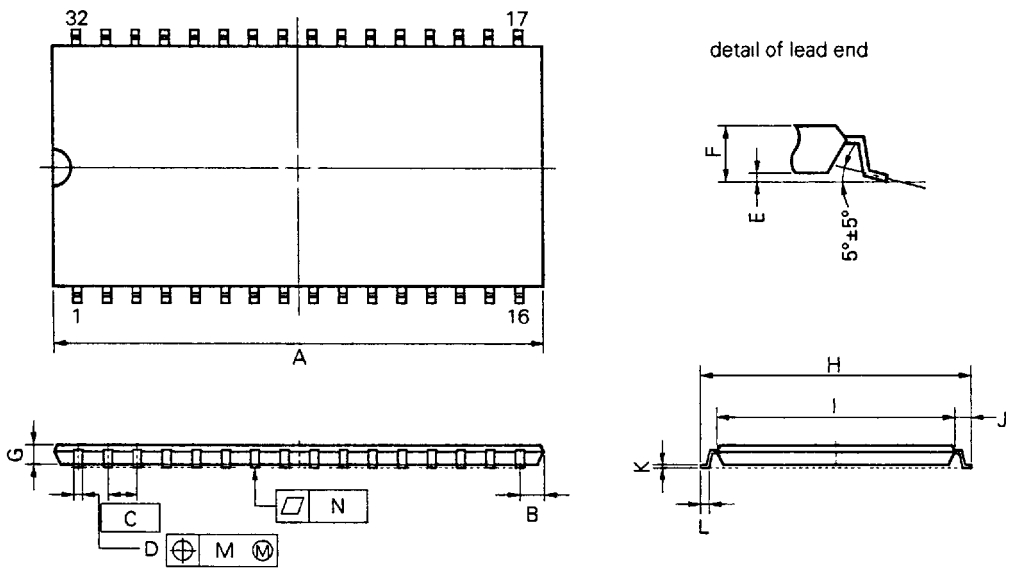
Each lead centerline is located within 0.21 mm (0.009 inch) of its true position (T.P.) at maximum material condition.

S28G5-50-7KD2

ITEM	MILLIMETERS	INCHES
A	18.81 MAX.	0.741 MAX.
B	1.15 MAX.	0.046 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40±0.10	0.016 ^{+0.004} _{-0.005}
E	0.05±0.05	0.002±0.002
F	1.1 MAX.	0.044 MAX.
G	0.97	0.038
H	11.76±0.2	0.463±0.008
I	10.16±0.1	0.400±0.004
J	0.8±0.2	0.031 ^{+0.009} _{-0.008}
K	0.125 ^{+0.10} _{-0.05}	0.005 ^{+0.004} _{-0.002}
L	0.5±0.15	0.020 ^{+0.006} _{-0.007}
M	0.21	0.009
N	0.10	0.004

32 PIN PLASTIC TSOP (400mil)

NEC Cord:S32G5-50-7JD1

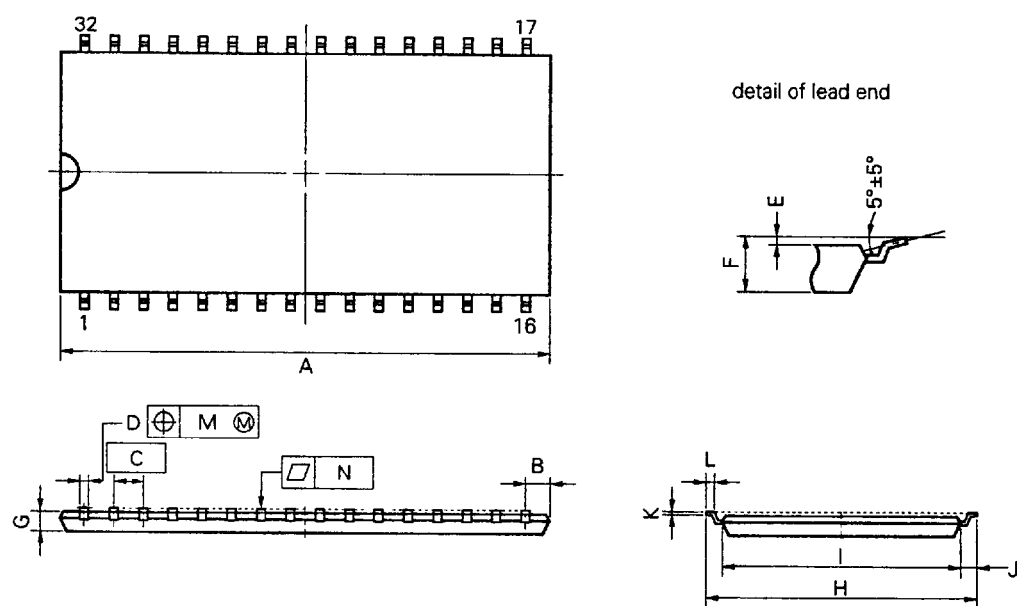


NOTE
Each lead centerline is located within 0.21 mm (0.009 inch) of its true position (T.P.) at maximum material condition.

S32G5-50-7JD1		
ITEM	MILLIMETERS	INCHES
A	21.17 MAX.	0.834 MAX.
B	1.06 MAX.	0.042 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40±0.10	0.016 ^{+0.004} _{-0.005}
E	0.05±0.05	0.002±0.002
F	1.1 MAX.	0.044 MAX.
G	0.97	0.038
H	11.76±0.2	0.463±0.008
I	10.16±0.1	0.400±0.004
J	0.8±0.2	0.031 ^{+0.009} _{-0.008}
K	0.125 ^{+0.10} _{-0.05}	0.005 ^{+0.004} _{-0.002}
L	0.5±0.15	0.020 ^{+0.006} _{-0.007}
M	0.21	0.009
N	0.10	0.004

32 PIN PLASTIC TSOP (400mil)
Reverse bent

NEC Cord:S32G5-50-7KD1

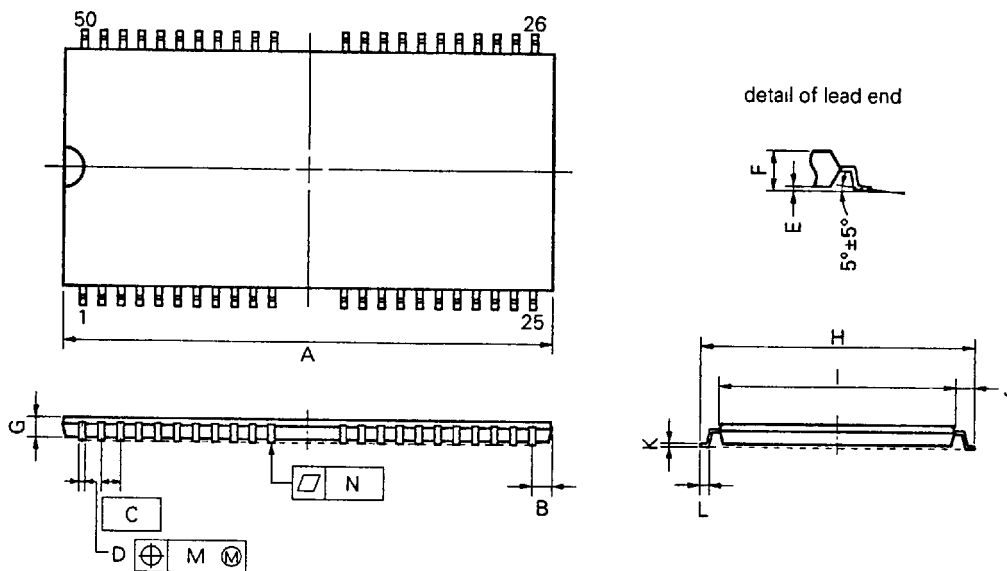


NOTE
Each lead centerline is located within 0.21 mm (0.009 inch) of its true position (T.P.) at maximum material condition.

S32G5-50-7KD1		
ITEM	MILLIMETERS	INCHES
A	21.17 MAX.	0.834 MAX.
B	1.06 MAX.	0.042 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40±0.10	0.016 ^{+0.004} _{-0.005}
E	0.05±0.05	0.002±0.002
F	1.1 MAX.	0.044 MAX.
G	0.97	0.038
H	11.76±0.2	0.463±0.008
I	10.16±0.1	0.400±0.004
J	0.8±0.2	0.031 ^{+0.009} _{-0.008}
K	0.125 ^{+0.10} _{-0.05}	0.005 ^{+0.004} _{-0.002}
L	0.5±0.15	0.020 ^{+0.006} _{-0.007}
M	0.21	0.009
N	0.10	0.004

50 PIN PLASTIC TSOP (400mil)
44 Leads

NEC Cord:S50G5-80-7JF



NOTE

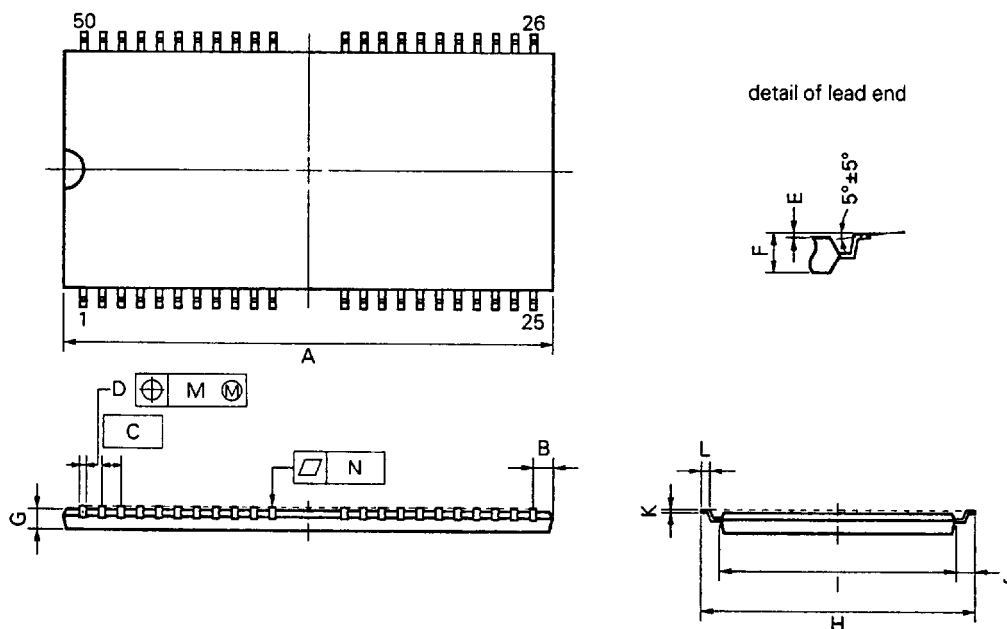
Each lead centerline is located within 0.13 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

S50G5-80-7JF

ITEM	MILLIMETERS	INCHES
A	21.45 MAX.	0.845 MAX.
B	1.13 MAX.	0.045 MAX.
C	0.8 (T.P.)	0.031 (T.P.)
D	0.30±0.10	0.012 ^{+0.004} _{-0.005}
E	0.05±0.05	0.002±0.002
F	1.1 MAX.	0.044 MAX.
G	0.97	0.038
H	11.76±0.2	0.463±0.008
I	10.16±0.1	0.400±0.004
J	0.8±0.2	0.031 ^{+0.009} _{-0.008}
K	0.125 ^{+0.10} _{-0.05}	0.005 ^{+0.004} _{-0.002}
L	0.5±0.15	0.020 ^{+0.006} _{-0.007}
M	0.13	0.005
N	0.10	0.004

50 PIN PLASTIC TSOP (400mil) 44 Leads Reverse bent

NEC Cord:S50G5-80-7KF



NOTE

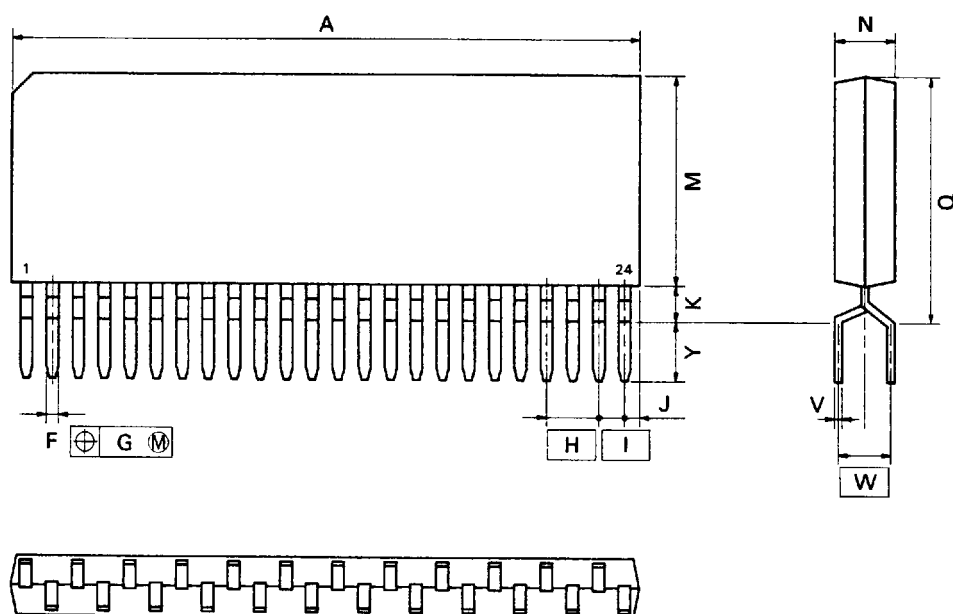
Each lead centerline is located within 0.13 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

S50G5-80-7KF

ITEM	MILLIMETERS	INCHES
A	21.45 MAX.	0.845 MAX.
B	1.13 MAX.	0.045 MAX.
C	0.8 (T.P.)	0.031 (T.P.)
D	0.30±0.10	0.012 ^{+0.004} _{-0.005}
E	0.05±0.05	0.002±0.002
F	1.1 MAX.	0.044 MAX.
G	0.97	0.038
H	11.76±0.2	0.463±0.008
I	10.16±0.1	0.400±0.004
J	0.8±0.2	0.031 ^{+0.003} _{-0.008}
K	0.125 ^{+0.10} _{-0.05}	0.005 ^{+0.004} _{-0.002}
L	0.5±0.15	0.020 ^{+0.006} _{-0.007}
M	0.13	0.005
N	0.10	0.004

24 PIN PLASTIC ZIP (475mil)

NEC Cord:P24V-100-475A



P24V-100-475A

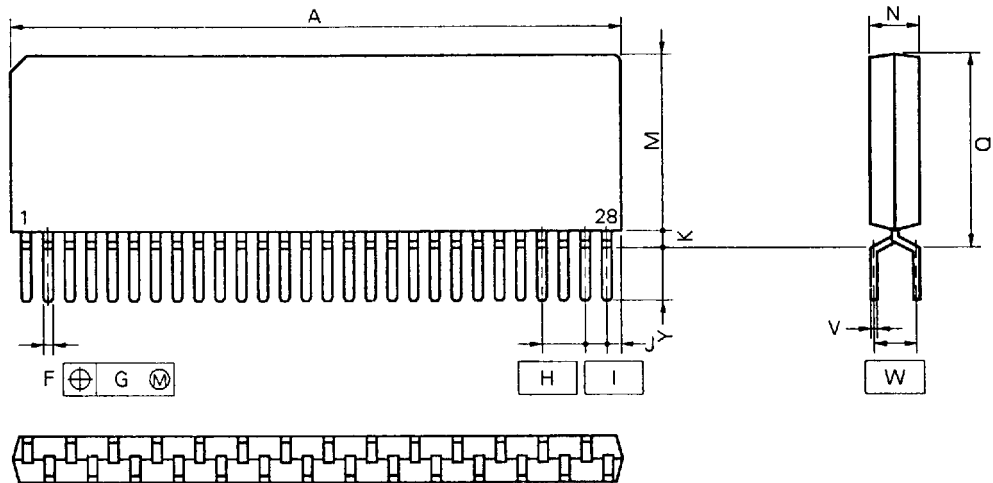
NOTE

Each lead centerline is located within 0.25 mm (0.010 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	31.75 MAX.	1.250 MAX.
F	0.50 ± 0.1	0.020 ± 0.004
G	$\phi 0.25$	$\phi 0.010$
H	2.54	0.100
I	1.27	0.050
J	1.27 MAX.	0.050 MAX.
K	1.0 MIN.	0.039 MIN.
M	10.8 MAX.	0.426 MAX.
N	2.8 ± 0.2	0.110 ± 0.008
Q	12.07 MAX.	0.476 MAX.
V	0.25 ± 0.10	0.010 ± 0.004
W	2.54	0.100
Y	3.3 ± 0.5	0.130 ± 0.02

28 PIN PLASTIC ZIP (475mil)

NEC Cord:P28VF-100-475A



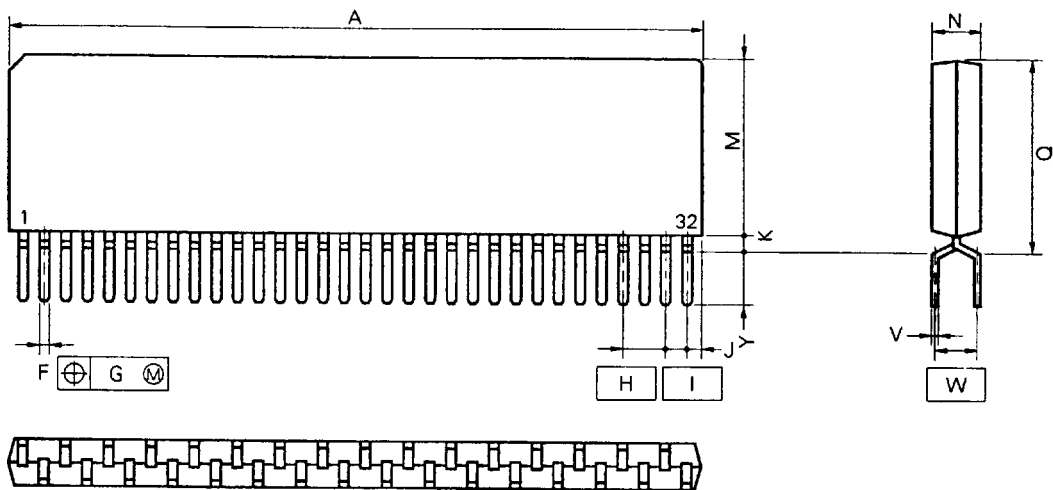
NOTE
Each lead centerline is located within 0.25 mm (0.010 inch) of its true position (T.P.) at maximum material condition.

P28VF-100-475A

ITEM	MILLIMETERS	INCHES
A	36.83 MAX.	1.450 MAX.
F	0.5±0.10	0.020 ^{+0.004} _{-0.005}
G	0.25	0.010
H	2.54 (T.P.)	0.100 (T.P.)
I	1.27 (T.P.)	0.050 (T.P.)
J	1.27 MAX.	0.050 MAX.
K	0.9 MIN.	0.035 MIN.
M	10.8 MAX.	0.426 MAX.
N	2.8±0.2	0.110 ^{+0.009} _{-0.008}
Q	12.07 MAX.	0.475 MAX.
V	0.25 ^{+0.10} _{-0.05}	0.010 ^{+0.004} _{-0.003}
W	2.54 (T.P.)	0.100 (T.P.)
Y	3.25±0.2	0.128±0.008

32 PIN PLASTIC ZIP (475mil)

NEC Cord:P32VF-100-475A



P32VF-100-475A

NOTE
Each lead centerline is located within 0.25 mm (0.010 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	41.91 MAX.	1.650 MAX
F	0.5±0.10	0.020 ^{+0.004} _{-0.005}
G	0.25	0.010
H	2.54 (T.P.)	0.100 (T.P.)
I	1.27 (T.P.)	0.050 (T.P.)
J	1.27 MAX.	0.050 MAX.
K	0.9 MIN.	0.035 MIN.
M	10.8 MAX.	0.426 MAX.
N	2.8±0.2	0.110 ^{+0.009} _{-0.008}
Q	12.07 MAX.	0.475 MAX.
V	0.25 ^{+0.10} _{-0.05}	0.010 ^{+0.004} _{-0.003}
W	2.54 (T.P.)	0.100 (T.P.)
Y	3.25±0.2	0.128±0.008