National Semiconductor

MICROCIRCUIT DATA SHEET

MV54AC2525-X-RH REV 1A0

Original Creation Date: 03/06/03
Last Update Date: 09/30/03
Last Major Revision Date: 06/30/03

Minimum Skew Clock Driver (GUARANTEED TO 300 krd(Si) TESTED TO MIL-STD-883, METHOD 1019)

General Description

The AC2525 is a minimum skew clock driver with one input driving eight outputs specifically designed for signal generation and clock distribution applications. The 2525 is designed to distribute a single clock to eight separate receivers with low skew across all outputs during both the TPHL and TPLH transitions.

Industry Part Number

54AC2525

NS Part Numbers

54AC2525WFQMLV
54AC2525WRQMLV

Prime Die

Z2525

Controlling Document

SEE FEATURES SECTION

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL STD 883, Method 5005

Subgrp	Description	Temp (^{O}C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Features

- Ideal for signal generation and clock distribution
- Guaranteed pin to pin and part to part skew
- Guaranteed 2000V minimum ESD protection
- 24 mA output drive capability

CONTROLLING DOCUMENT:

54AC2525WFQMLV	5962F9217401VDA
54AC2525WRQMLV	5962R9217401VDA

(Absolute Maximum Ratings)

(Note 1)

Supply Voltage (Vcc)	-0.5V to +7.0V
DC Input Diode Current (Iik)	
Vi = -0.5V	-20 mA
Vi = Vcc +0.5V	+20 mA
DC Input Voltage (Vi)	-0.5V to Vcc + 0.5V
DC Output Diode Current (Iok)	
Vo = -0.5V	-20 mA
Vo = Vcc +0.5V	+20 mA
DC Output Voltage (Vo)	-0.5V to Vcc +0.5V
DC Output Source or Sink Current (Io)	±50 mA
DC Vcc or Ground Current per Output Pin (Icc or Ignd)	±50 mA
Storage Temperature(Tstg)	-65 C to +150 C
Junction Temprature (Tj)	
CDIP	175 C
ESD Tolerance (Note 2)	5350V

Note 1: Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, output/input loading variables. National does not recommend operation of FACT TM circuits outside databook specifications.

Recommended Operating Conditions

Supply Voltage (Vcc)	2.0V to 6.0V
Input Voltage (Vi)	0V to Vcc
Output Voltage (Vo)	0V to Vcc
Operating Temperature (Ta)	-55 C to +125 C
Minimum Input Edge Rate (Delta V/Delta t)	
AC Devices	
Vin from 30% to 70% of Vcc	
Vcc @ 3.0V, 4.5V, 5.5V	125mV/ns

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: VCC 3.0V to 5.5V, Temp. Range: -55 C to 125 C. NOTE: -55C TEMPERATURE, SUBGROUP 3 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH	High level input Current	VCC=5.5V, VM=5.5V	1, 2	INPUTS		0.1	uA	1
			1, 2	INPUTS		1.0	uA	2, 3
IIL	Low level input Current	VCC=5.5V, VM=0.0V	1, 2	INPUTS		-0.1	uA	1
			1, 2	INPUTS		-1.0	uA	2, 3
VOL	Low level Output Voltage	VCC=3.0V, VIL=0.9V, VINH=3.0V, IOL=50.0uA	1, 2	OUTPUTS		.10	V	1, 2, 3
		VCC=4.5V, VIL=1.35V, VINH=4.5V, IOL=50.0uA	1, 2	OUTPUTS		.10	V	1, 2, 3
		VCC=5.5V, VIL=1.65V, VINH=5.5V, IOL=50.0uA	1, 2	OUTPUTS		.10	V	1, 2, 3
		VCC=3.0V, VIL=0.9V, VINH=3.0V, IOL=12.0mA	1, 2	OUTPUTS		.32	V	1
			1, 2	OUTPUTS		.40	V	2, 3
		VCC=4.5V, VIL=1.35V, VINH=4.5V, IOL=24.0mA	1, 2	OUTPUTS		.36	V	1
			1, 2	OUTPUTS		.50	V	2, 3
		VCC=5.5V, VIL=1.65V, VINH=5.5V, IOL=24.0mA	1, 2	OUTPUTS		.36	V	1
			1, 2	OUTPUTS		.50	V	2, 3
VIOL	Dynamic Output Current LOW	VCC=5.5V, VIL=1.65V, VIH=3.85V, IOL=50.0mA, VINH=5.5V	1, 2, 5	OUTPUTS		1.65	V	1, 2, 3
VOH	High Level Output Voltage	VCC=3.0V, VINL=0.0V, VIH=2.1V, IOH=-50uA	1, 2	OUTPUTS	2.90		V	1, 2, 3
		VCC=4.5V, VINL=0.0V, VIH=3.15V, IOH=-50.0uA	1, 2	OUTPUTS	4.40		V	1, 2, 3
		VCC=5.5V, VINL=0.0V, VIH=3.85V, IOH=-50.0uA	1, 2	OUTPUTS	5.40		V	1, 2, 3
		VCC=3.0V, VIH=2.1V, IOH=-12.0mA	1, 2	OUTPUTS	2.56		V	1
			1, 2	OUTPUTS	2.40		V	2, 3
		VCC=4.5V, VIH=3.15V, IOH=-24.0mA	1, 2	OUTPUTS	3.86		V	1
			1, 2	OUTPUTS	3.70		V	2, 3
		VCC=5.5V, VIH=3.85V, IOH=-24.0mA	1, 2	OUTPUTS	4.86		V	1
			1, 2	OUTPUTS	4.70		V	2, 3
VIOH	Dynamic Output Current HIGH	VCC=5.5V, VIH=3.85V, IOH=-50.0mA, VINH=5.5V,	1, 2, 5	OUTPUTS	3.85		V	1, 2, 3
ICCH	Supply Current Outputs HIGH	VCC=5.5V, VINH=5.5V	1, 2	VCC		90	nA	1
			1, 2	VCC		80	uA	2, 3

Electrical Characteristics

DC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: VCC 3.0V to 5.5V, Temp. Range: -55 C to 125 C. NOTE: -55C TEMPERATURE, SUBGROUP 3 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
ICCL	Supply Current Outputs LOW	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 2	VCC		90	nA	1
			1, 2	VCC		80	uA	2, 3
VIC-	Negative Input Clamp Voltage	VCC=Open, IM=-1.0mA	8, 9	INPUT	-0.40	-1.50	V	1
VIC+	Positive Input Clamp Voltage	VCC=0.0V, IM=1.0mA	8, 9	INPUT	0.40	1.50	V	1

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: CL=50pf, Rl=500 Ohms, TR=3.0V, TF=3.0V, Temp Range:-55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

TPLH(1)	Propagation Delay	VCC=4.5V	3, 4, 7	CKIN-On	3.0	7.0	ns	9
			3, 4, 7	CKIN-On	4.2	8.2	ns	10
			3, 4, 7	CKIN-On	2.5	6.5	ns	11
TPHL(1)	Propagation Delay	VCC=4.5V	3, 4, 7	CKIN-On	3.0	7.0	ns	9
			3, 4, 7	CKIN-On	4.2	8.2	ns	10
			3, 4, 7	CKIN-On	2.5	6.5	ns	11
tosHL(1)	Maximum Skew Common Edge Output to Output	VCC=4.5V	6	On-On Skew		0.5	ns	9
			6	On-On Skew		0.7	ns	10, 11
tosLH(1)	Maximum Skew Common Edge Output to Output	VCC=4.5V	6	On-On Skew		0.5	ns	9
			6	On-On Skew		0.7	ns	10, 11
tpV	Maximum Skew Part to Part	VCC=4.5V	6	Max Skew Part/Part		4.0	ns	9, 10, 11
tost(1)	Maximum Skew Opposite Edge Output to Output	VCC=4.5V	6	Opposite Edge Skew		1.0	ns	9, 10, 11
tRISE, tFALL	Maximum Rise/Fall Time (20% to 80% of Vcc)	VCC = 4.5V CL = 50pf RL = 500 Ohms	6			4.0	ns	9
			6			5.0	ns	10, 11

Electrical Characteristics

AC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: CL=50pf, Rl=500 Ohms, TR=3.0V, TF=3.0V, Temp Range:-55C to 125C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpHL(2)	Propagation Delay	VCC=3.0V	3, 4, 7	CKIN-On	4.0	9.5	ns	9
			3, 4, 7	CKIN-On	5.0	11.0	ns	10
			3, 4, 7	CKIN-On	3.0	8.5	ns	11
tpLH(2)	Propagation Delay	VCC=3.0V	3, 4, 7	CKIN-On	4.0	9.5	ns	9
			3, 4, 7	CKIN-On	5.0	11.0	ns	10
			3, 4, 7	CKIN-On	3.0	8.5	ns	11
tosHL(2)	Maximum Skew Common Edge Output to Output	VCC=3.0V	6	On-On Skew		0.5	ns	9
			6	On-On Skew		0.6	ns	10, 11
tosLH(2)	Maximum Skew Common Edge Output to Output	VCC=3.0V	6	On-On Skew		0.5	ns	9
			6	On-On Skew		0.6	ns	10, 11
tost(2)	Maximum Skew Opposite Edge Output to Output	VCC=3.0V	6	Opposite Skew Edge		1.5	ns	9, 10, 11
tRISE, tFALL	Max Rise/Fall Time (20% to 80% of Vcc)	VCC = 3.0V CL = 50pf RL = 500 Ohms	6			4.0	ns	9
			6			5.0	ns	10, 11
tRISE, tFALL	Max Rise/Fall Time (20% to 60% of Vcc)	VCC = 3.0V CL = 14pf Minimum RL = 1000 Ohms	6			1.2	ns	9, 10, 11

Electrical Characteristics

AC/DC PARAMETERS: POST RADIATION LIMITS (SEE NOTE 10)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: The 300 krd(Si) DOSE LEVEL INCLUDES A POST IRRADIATION 168 HOUR, 25 Deg C BIASED ANNEAL

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
ICCH	Supply Current Outputs HIGH	VCC = 5.5V, VINH=5.5V (M = 3k RAD)	10			50	uA	1
		VCC = 5.5V, VINH=5.5V (D = 10k RAD)	10			200	uA	1
		VCC = 5.5V, VINH=5.5V (P = 30k, L = 50k, R = 100k RAD)	10			700	uA	1
ICCL	Supply Current Outputs LOW	VCC = 5.5V, VINH = 5.5V, VINL = 0.0V (M = 3k RAD)	10			50	uA	1
		VCC = 5.5V, VINH = 5.5V, VINL = 0.0V (D = 10k RAD)	10			200	uA	1
		VCC = 5.5V, VINH=5.5V (P = 30k, L = 50k, R = 100k RAD)	10			700	uA	1
TPLH(1)	Propagation Delay	VCC = 4.5V (F = 300k RAD)	10		3.0	8.5	nS	9
TPHL(1)	Propagation Delay	VCC = 4.5V (F = 300k RAD)	10		3.0	8.5	nS	9
tpHL(2)	Propagation Delay	VCC = 3.0V (F = 300k RAD)	10		4.0	10.5	nS	9
tpLH(2)	Propagation Delay	VCC = 3.0V (F = 300k RAD)	10		4.0	10.5	nS	9

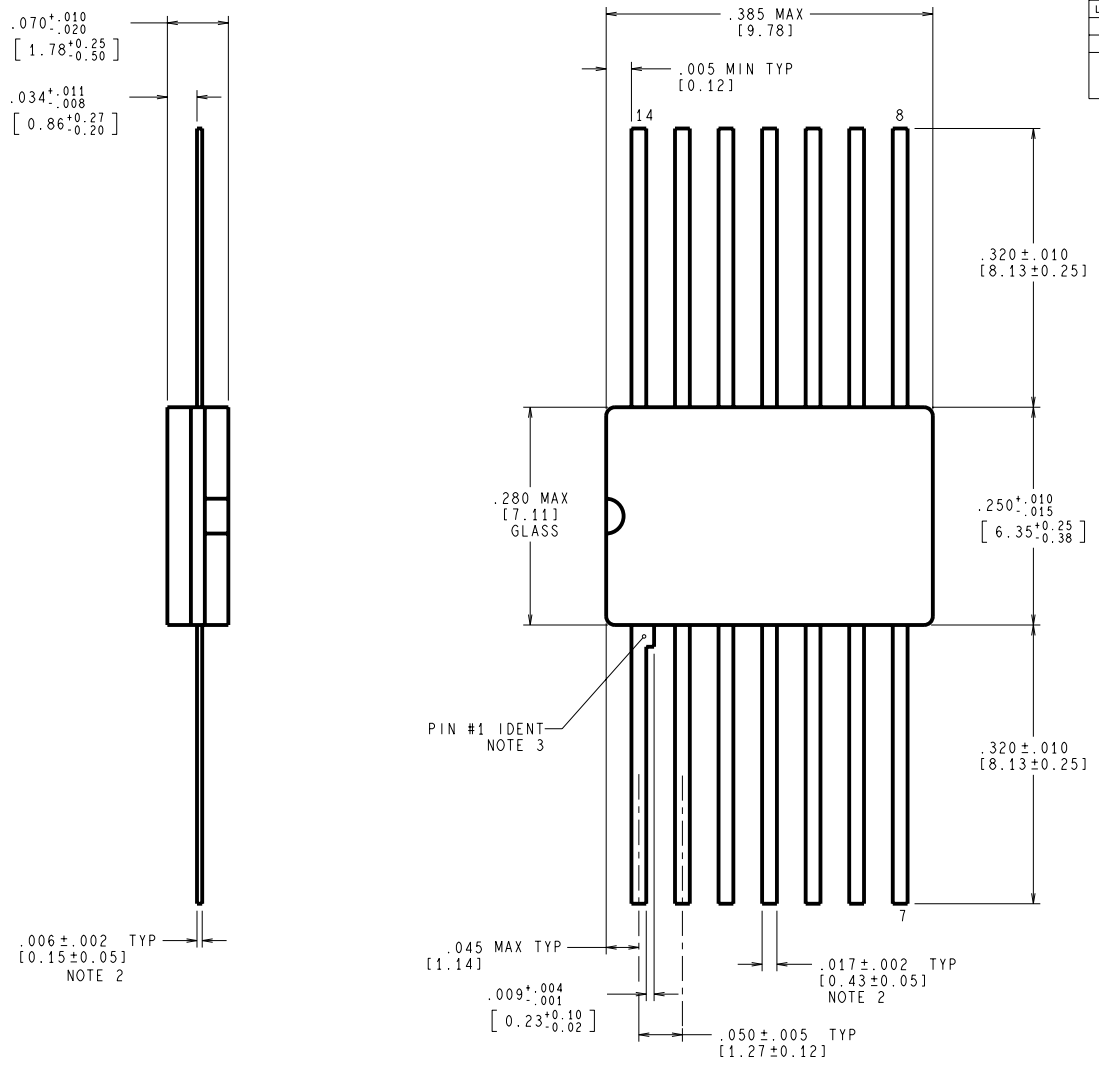
Note 1: SCREEN TESTED 100% ON EACH DEVICE AT +25C & +125C TEMPERATURE, SUBGROUPS 1, 2, 7, & 8.
Note 2: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C & +125C TEMPERATURE, SUBGROUPS A1, 2, 7, & 8.
Note 3: SCREEN TESTED 100% ON EACH DEVICE AT +25C TEMPERATURE ONLY, SUBGROUP A9.
Note 4: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C & +125C TEMPERATURE, SUBGROUPS A9 & 10.
Note 5: TRANSMISSION LINE DRIVING TEST, GUARDBAND LIMITS SET FOR +25C, 2 MSEC DURATION MAX.
Note 6: DESIGN CHARACTERIZATION DATA ONLY (Bench Test)
Note 7: +25C & +125C MIN LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MIN. LIMITS.
Note 8: SCREEN TESTED 100% ON EACH DEVICE AT +25 C TEMPERATURE ONLY, SUBGROUP 1.
Note 9: SAMPLE TESTED (METHOD 5005, TABLE 1) AT +25 C TEMPERATURE ONLY, SUBGROUP 1.
Note 10: Pre and post irradiation limits are identical to those listed under AC and DC electrical characteristics subgroups 1, 7, 9 except if listed in the Post Radiation Limits Table (IF APPLICABLE). Radiation end point limits for the noted parameters are guaranteed only for the conditions as specified.

Graphics and Diagrams

GRAPHICS#	DESCRIPTION
W14BRN	CERPACK (W), 14 LEAD (P/P DWG)

See attached graphics following this page.

REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
L	REVISE AND REDRAW PER NEW STANDARD.	10513	07/26/94	DEG/AEP
M	.017±.002 WAS .017±.020.	10655	10/21/94	DEG/CD
N	L/F THKS .006±.002 WAS .005±.001; UPDATE NOTES 1 & 2; REMOVE NOTE 4; UPDATE MILAERO STAMP; DUAL DIM'S WERE INCHES ONLY.	11005	06/08/95	MS/



NOTES: UNLESS OTHERWISE SPECIFIED.

1. LEAD FINISH: SOLDER DIPPED WITH Sn60 OR Sn63 SOLDER CONFORMING TO MIL-I-38535 TO A MINIMUM THICKNESS OF 200 MICROINCHES/ 5.08 MICROMETERS. SOLDER MAY BE APPLIED OVER LEAD BASIS METAL OR Sn PLATE.
2. MAXIMUM LIMIT MAY BE INCREASED BY .003 INCHES/ 0.08 MILLIMETERS AFTER LEAD FINISH APPLIED.
3. LEAD 1 IDENTIFICATION SHALL BE:
   a) A NOTCH OR OTHER MARK WITHIN THIS AREA
   b) A TAB ON LEAD 1, EITHER SIDE

CONTROLLING DIMENSION IS INCH
VALUES IN [ ] ARE MILLIMETERS

MIL-I-38535
CONFIGURATION CONTROL

APPROVALS	DATE
DRAWN D.E.Grady	07/26/94
DFTG. CHK.	
ENGR. CHK.	

PROJECTION INCH [MM]

National Semiconductor
2900 Semiconductor dr, Santa Clara, CA 95052-8090

CERPACK, 14 LEAD

SCALE	SIZE	DRAWING NUMBER	REV
N/A	C	MKT-W14B	N

DO NOT SCALE DRAWING | SHEET 1 of 1

Revision History

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0004137	10/01/03	Rose Malone	Initial MDS Release: MV54AC2525-X-RH, Rev. 0A0
1A0	M0004175	09/30/03	Rose Malone	Updated MV54AC2525-X-RH, Rev. 0A0 to MV54AC2525-X-RH, Rev. 1A0. Update MDS to reflect 300 k rad on Main Table, Electrical Section, AC/DC Post Radiation Limits and Note number 10.