

MNSCAN18540T-X REV 1A0

 Original Creation Date: 10/23/98
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**SERIALLY CONTROLLED ACCESS NETWORK INVERTING LINE
 DRIVER WITH TRI-STATE OUTPUTS**
General Description

The SCAN18540T is a high speed, low-power line driver featuring separate data inputs organized into dual 9-bit bytes with byte-oriented paired output enable control signals. This device is compliant with IEEE 1149.1 Standard Test Access Port and BOUNDARY-SCAN Architecture with the incorporation of the defined BOUNDARY-SCAN test logic and test access port consisting of Test Data input (TDI), Test Data Out (TDO), Test Mode Select (TMS), and Test Clock (TCK).

Industry Part Number

SCAN18540T

NS Part Numbers

SCAN18540TFMQB

Prime Die

YJ540

Controlling Document

5962-93127

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°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

- Dual Output enable signal per byte
- TRI-STATE outputs for bus-oriented applications
- 9-bit data busses for parity applications
- Reduced-swing outputs source 24 mA/sink 48 mA.
- Guaranteed to drive 50 Ohm transmission line to TTL input levels of 0.8V and 2.0V.
- TTL compatible inputs
- IEEE 1149.1 (JTAG) Compliant
- Includes CLAMP and HIGH-Z instructions

(Absolute Maximum Ratings)

Supply Voltage (Vcc)	-0.5V to +7.0V
DC Input Diode Current (Iik)	
Vin = -0.5V	-20 mA
Vin = Vcc +0.5V	+20 mA
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/Sink Current (Io)	± 70mA
DC Vcc or Ground Current Per Output Pin	± 70mA
Junction Temperature (Tj)	
Ceramic Flatpack	+175 C
Thermal Resistance	
Junction-To-Case (Theta JC)	5 C/Watt
Junction-To-Ambient (Theta JA)	65 C/Watt
(1 Watt at no airflow)	
Storage Temperature	-65 C to +150 C
Lead Temperature	
(Soldering, 10 seconds)	+300 C
ESD Classification	CLASS 3
Maximum Power Dissipation	750 mW

Recommended Operating Conditions

Supply Voltage (Vcc)	4.5V to 5.5V
Input Voltage (Vi)	0V to Vcc
Output Voltage (Vo)	0V to Vcc
Operating Temperature	-55 C to +125 C
Minimum Input Edge Rate (dV/dt)	
Vin from 0.8V to 2.0V	
Vcc @ 4.5V 5.5V	125 mV/nS
Maximum Output Current	
High Level (IOH)	-24 mA
Low Level (IOL)	48 mA

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: 4.5V 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	Input HIGH Current	VCC=5.5V, VIH=5.5V	1, 3	INPUT		0.1	uA	1
			1, 3	INPUT		0.9	uA	2, 3
IIHR	Input HIGH Current	VCC=5.5V, VIH=5.5V	1, 3	TDI/TMS		2.8	uA	1
			1, 3	TDI/TMS		3.7	uA	2, 3
IIL	Input LOW Current	VCC=5.5V, VIL=0.0V	1, 3	INPUT		-0.1	uA	1
			1, 3	INPUT		-0.9	uA	2, 3
IILR	Input LOW Current	VCC=5.5V, VIL=0.0V	1, 3	TDI/TMS	-160	-385	uA	1, 2, 3
VOL	Output LOW Voltage	VCC=4.5V, IOL=50.0uA, VIL=0.8V, VIH=2.0V	1, 3	OUTPUT		.10	V	1, 2, 3
		VCC=5.5V, IOL=50.0uA, VIL=0.8V, VIH=2.0V	1, 3	OUTPUT		.10	V	1, 2, 3
		VCC=4.5V, IOL=48.0mA, VIL=0.8V, VIH=2.0V	1, 3	OUTPUT		.55	V	1, 2, 3
		VCC=5.5V, IOL=48.0mA, VIL=0.8V, VIH=2.0V	1, 3	OUTPUT		.55	V	1, 2, 3
VIOL	Output LOW Voltage	VCC=5.5V, IOL=63.0mA, VIL=0.0V, VIH=5.5V	1, 3, 5	OUTPUT		0.8	V	1, 2, 3
VOH	Output HIGH Voltage	VCC=4.5V, IOH=-50.0uA, VIL=0.8V, VIH=2.0V	1, 3	OUTPUT	3.15		V	1, 2, 3
		VCC=5.5V, IOH=-50.0uA, VIL=0.8V, VIH=2.0V	1, 3	OUTPUT	4.15		V	1, 2, 3
		VCC=4.5V, IOH=-24.0mA, VIL=0.8V, VIH=2.0V	1, 3	OUTPUT	2.4		V	1, 2, 3
		VCC=5.5V, IOH=-24.0mA, VIL=0.8V, VIH=2.0V	1, 3	OUTPUT	2.4		V	1, 2, 3
VIOH	Output HIGH Voltage	VCC=5.5V, IOH=-27.0mA, VIL=0.0V, VIH=5.5V	1, 3, 5	OUTPUT	2.0		V	1, 2, 3
ICC	Supply Current	VCC=5.5V, VIH=5.5V, TDI/TMS = VCC, VO = OPEN	1, 3	VCC		16	uA	1
			1, 3	VCC		168	uA	2, 3
ICCM (MAX)	Supply Current	VCC=5.5V, VIH=5.5V, TDI/TMS = Gnd, VO = OPEN	1, 3	VCC		750	uA	1
			1, 3	VCC		930	uA	2, 3
ICCT	Supply Current	VCC=5.5V, VINH=3.4V, TDI/TMS = VCC	1, 3	VCC		2.0	mA	1, 2, 3
ICCTR (MAX)	Supply Current	VCC=5.5V, VINH=3.4V, TDI/TMS Pin, Test one with the other floating	1, 3	VCC		2.15	mA	1, 2, 3

Electrical Characteristics

DC PARAMETERS(Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: 4.5V 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
IOZH	Output Leakage Current	VCC=4.5V, VIL=4.5V, VIH (OE)=2.0V	1, 3	OUTPUTS		0.5	uA	1
			1, 3	OUTPUTS		10	uA	2, 3
		VCC=5.5V, VIL=4.5V, VIH (OE)=2.0V	1, 3	OUTPUTS		0.5	uA	1
			1, 3	OUTPUTS		10	uA	2, 3
IOZL	Output Leakage Current	VCC=4.5V, VIL=0.0V, VIH (OE)=2.0V	1, 3	OUTPUTS		-0.5	uA	1
			1, 3	OUTPUTS		-10.0	uA	2, 3
		VCC=5.5V, VIL=0.0V, VIH (OE)=2.0V	1, 3	OUTPUTS		-0.5	uA	1
			1, 3	OUTPUTS		-10.0	uA	2, 3
IOS	Output Short Circuit Current	VCC=5.5V, VIN=5.5V, VOUT=0.0V,	1, 3	OUTPUTS		-100	mA	1, 2, 3
VIKL	Clamp Diode Voltage	VCC=4.5V, IKL=-18mA	1, 3	INPUT		-1.2	V	1, 2, 3
VIKH	Clamp Diode Voltage	VCC=4.5V, IKH=18mA	1, 3	INPUT		5.7	V	1, 2, 3
CIN	Input Pin Capacitance	VCC=5.0V	6			5	pF	1
COUT	Output Pin Capacitance	VCC=5.0V	6			15	pF	1
CPD	Power Dissipation Capacitance	VCC=5.0V	6			35	pF	1
VILD	Maximum LOW Dynamic Input Voltage Level	VCC=5.0V, LOAD: 50pF / 500 OHMS	6, 9	INPUT	0.8		V	1
VIHD	Minimum HIGH Dynamic Input Voltage Level	VCC=5.0V, LOAD: 50pF / 500 OHMS	6, 9	INPUT		2.0	V	1
VOLP	Maximum High Output Noise	VCC=5.0V, LOAD: 50pF / 500 OHMS	6, 8	INPUT		0.8	V	1
VOLV	Maximum Low Output Noise	VCC=5.0V, LOAD: 50pF / 500 OHMS	6, 8	INPUT		-0.8	V	1
VOHP	Maximum Overshoot	VCC=5.0V, LOAD: 50pF / 500 OHMS	6, 8	INPUT		VOH + 0.8	V	1
VOHV	Minimum Vcc Droop	VCC=5.0V, LOAD: 50pF / 500 OHMS	6, 8	INPUT		VOH - 0.8	V	1

Electrical Characteristics

AC Parameters: NORMAL OPERATION

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pF, RL=500 OHMS, TRISE/TFALL=3.0ns, Temp. Range: -55 C to 125 C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLH	Propagation Delay	VCC=4.5V	2, 4, 7	CP to Qn	2.5	9.0	nS	9
			2, 4, 7	CP to Qn	2.5	10.5	nS	10, 11
tpHL	Propagation Delay	VCC=4.5V	2, 4, 7	CP to Qn	2.5	9.0	nS	9
			2, 4, 7	CP to Qn	2.5	11.0	nS	10, 11
tpZH	Output Enable Time	VCC=4.5V	2, 4, 7	QE to Qn	2.0	11.0	nS	9
			2, 4, 7	QE to Qn	2.0	12.0	nS	10, 11
tpZL	Output Enable Time	VCC=4.5V	2, 4, 7	QE to Qn	2.0	12.3	nS	9
			2, 4, 7	QE to Qn	2.0	14.0	nS	10, 11
tpHZ	Output Disable Time	VCC=4.5V	2, 4, 7	QE to Qn	1.5	10.2	nS	9
			2, 4, 7	QE to Qn	1.5	11.2	nS	10, 11
tpLZ	Output Disable Time	VCC=4.5V	2, 4, 7	QE to Qn	1.5	10.2	nS	9
			2, 4, 7	QE to Qn	1.5	11.2	nS	10, 11
TOSHL	HL Data to Output	VCC=4.5V	6	Pin to Pin Skew		1.0	nS	9, 10, 11
TOSLH	LH Data to Output	VCC=4.5V	6	Pin to Pin Skew		1.0	nS	9, 10, 11

AC Parameters: SCAN TEST OPERATION

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pF, RL=500 OHMS, TRISE/TFALL=3.0ns, Temp. Range: -55 C to 125 C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

tpLH(1)	Propagation Delay	VCC=4.5V	2, 4, 7	TCK to TD0	3.5	13.2	nS	9
			2, 4, 7	TCK to TD0	3.5	15.8	nS	10, 11

Electrical Characteristics

AC Parameters: SCAN TEST OPERATION (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pF, RL=500 OHMS, TRISE/TFALL=3.0ns, Temp. Range: -55 C to 125 C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpHL(1)	Propagation Delay	VCC=4.5V	2, 4, 7	TCK to TD0	3.5	13.2	nS	9
			2, 4, 7	TCK to TD0	3.5	15.8	nS	10, 11
tpZH(1)	Output Enable Time	VCC=4.5V	2, 4, 7	TCK to TD0	3.0	14.5	nS	9
			2, 4, 7	TCK to TD0	3.0	16.7	nS	10, 11
tpZL(1)	Output Enable Time	VCC=4.5V	2, 4, 7	TCK to TD0	3.0	15.0	nS	9
			2, 4, 7	TCK to TD0	3.0	16.7	nS	10, 11
tpHZ(1)	Output Disable Time	VCC=4.5V	2, 4, 7	TCK to TD0	2.5	11.5	nS	9
			2, 4, 7	TCK to TD0	2.5	12.8	nS	10, 11
tpLZ(1)	Output Disable Time	VCC=4.5V	2, 4, 7	TCK to TD0	2.5	12.0	nS	9
			2, 4, 7	TCK to TD0	2.5	12.8	nS	10, 11
tpLH(2)	Propagation Delay	VCC=4.5V During Update-DR state	2, 4, 7	TCK to Data Out	5.0	18.0	nS	9
			2, 4, 7	TCK to Data Out	5.0	21.7	nS	10, 11
tpHL(2)	Propagation Delay	VCC=4.5V During Update-DR state	2, 4, 7	TCK to Data Out	5.0	18.0	nS	9
			2, 4, 7	TCK to Data Out	5.0	21.7	nS	10, 11
tpLH(3)	Propagation Delay	VCC=4.5V During Update-IR state	2, 4, 7	TCK to Data Out	5.0	18.6	nS	9
			2, 4, 7	TCK to Data Out	5.0	21.2	nS	10, 11

Electrical Characteristics

AC Parameters: SCAN TEST OPERATION (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pF, RL=500 OHMS, TRISE/TFALL=3.0ns, Temp. Range: -55 C to 125 C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpHL(3)	Propagation Delay	VCC=4.5V During Update-IR state	2, 4, 7	TCK to Data Out	5.0	18.6	nS	9
			2, 4, 7	TCK to Data Out	5.0	21.2	nS	10, 11
tpLH(4)	Propagation Delay	VCC=4.5V During Test Logic Reset	2, 4, 7	TCK to Data Out	5.5	19.9	nS	9
			2, 4, 7	TCK to Data Out	5.5	23.0	nS	10, 11
tpHL(4)	Propagation Delay	VCC=4.5V During Test Logic Reset	2, 4, 7	TCK to Data Out	5.5	19.9	nS	9
			2, 4, 7	TCK to Data Out	5.5	23.0	nS	10, 11
tpLZ(2)	Output Disable Time	VCC=4.5V During Update-DR state	2, 4, 7	TCK to Data Out	4.0	16.4	nS	9
			2, 4, 7	TCK to Data Out	4.0	19.6	nS	10, 11
tpHZ(2)	Output Disable Time	VCC=4.5V During Update-DR state	2, 4, 7	TCK to Data Out	4.0	16.4	nS	9
			2, 4, 7	TCK to Data Out	4.0	19.6	nS	10, 11
tpLZ(3)	Output Disable Time	VCC=4.5V During Update-IR state	2, 4, 7	TCK to Data Out	5.0	19.5	nS	9
			2, 4, 7	TCK to Data Out	5.0	22.4	nS	10, 11
tpHZ(3)	Output Disable Time	VCC=4.5V During Update-IR state	2, 4, 7	TCK to Data Out	5.0	19.5	nS	9
			2, 4, 7	TCK to Data Out	5.0	22.4	nS	10, 11

Electrical Characteristics

AC Parameters: SCAN TEST OPERATION (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pF, RL=500 OHMS, TRISE/TFALL=3.0ns, Temp. Range: -55 C to 125 C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLZ(4)	Output Disable Time	VCC=4.5V During Test Logic Reset	2, 4, 7	TCK to Data Out	5.0	19.9	nS	9
			2, 4, 7	TCK to Data Out	5.0	23.3	nS	10, 11
tpHZ(4)	Output Disable Time	VCC=4.5V During Test Logic Reset	2, 4, 7	TCK to Data Out	5.0	19.9	nS	9
			2, 4, 7	TCK to Data Out	5.0	23.3	nS	10, 11
tpZL(2)	Output Enable Time	VCC=4.5V During Update-DR state	2, 4, 7	TCK to Data Out	5.0	18.9	nS	9
			2, 4, 7	TCK to Data Out	5.0	22.6	nS	10, 11
tpZH(2)	Output Enable Time	VCC=4.5V During Update-DR state	2, 4, 7	TCK to Data Out	5.0	18.9	nS	9
			2, 4, 7	TCK to Data Out	5.0	22.6	nS	10, 11
tpZL(3)	Output Enable Time	VCC=4.5V During Update-IR state	2, 4, 7	TCK to Data Out	6.5	22.4	nS	9
			2, 4, 7	TCK to Data Out	6.5	26.2	nS	10, 11
tpZH(3)	Output Enable Time	VCC=4.5V During Update-IR state	2, 4, 7	TCK to Data Out	6.5	22.4	nS	9
			2, 4, 7	TCK to Data Out	6.5	26.2	nS	10, 11
tpZL(4)	Output Enable Time	VCC=4.5V During Test Logic Reset	2, 4, 7	TCK to Data Out	7.0	23.8	nS	9
			2, 4, 7	TCK to Data Out	7.0	27.4	nS	10, 11

Electrical Characteristics

AC Parameters: SCAN TEST OPERATION (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)

AC: CL=50pF, RL=500 OHMS, TRISE/TFALL=3.0ns, Temp. Range: -55 C to 125 C. NOTE: -55C TEMPERATURE, SUBGROUP 11 IS GUARANTEED BUT NOT TESTED.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpZH(4)	Output Enable Time	VCC=4.5V During Test Logic Reset	2, 4, 7	TCK to Data Out	7.0	23.8	nS	9
			2, 4, 7	TCK to Data Out	7.0	27.4	nS	10, 11
Tset (H/L)(1)	Setup Time	VCC=4.5V	6	Data to TCK	3.0		nS	9, 10, 11
Thold(L/H)(1)	Hold Time	VCC=4.5V	6	Data to TCK	4.5		nS	9
			6	Data to TCK	5.5		nS	10, 11
Tset (L/H)(2)	Setup Time	VCC=4.5V A0E or B0E to TCK	6		3.0		nS	9, 10, 11
Thold(L/H)(2)	Hold Time	VCC=4.5V TCK to A0E or B0E	6		4.5		nS	9, 10, 11
Tset (L/H)(3)	Setup Time	VCC=4.5V Internal ADE, B0E to TCK	6		3.0		nS	9, 10, 11
Thold(L/H)(3)	Hold Time	VCC=4.5V TCK to Internal A0E, B0E	6		3.0		nS	9, 10, 11
Tset (L/H)(4)	Setup Time	VCC=4.5V	6	TMS to TCK	8.0		nS	9, 10, 11
Thold(L/H)(4)	Hold Time	VCC=4.5V	6	TCK to TMS	2.0		nS	9, 10, 11
Tset (L/H)(5)	Setup Time	VCC=4.5V	6	TDI to TCK	4.0		nS	9, 10, 11
Thold(L/H)(5)	Hold Time	VCC=4.5V	6	TCK to TDI	4.5		nS	9, 10, 11
Tw	Pulse Width HIGH	VCC=4.5V	6	TCK (H)	12.0		nS	9, 10, 11
Tw	Pulse Width LOW	VCC=4.5V	6	TCK (L)	5.0		nS	9, 10, 11
Fmax	Maximum Clock Frequency	VCC= 4.5V	6	TCK	25		Mhz	9, 10, 11
Tpu	Power Up to TCK	VCC= 4.5V	6	Wait Time		100	nS	9, 10, 11
Tpd	Power Down Delay	VCC= 0.0V	6			100	mS	9, 10, 11

Note 1: SCREEN TESTED 100% ON EACH DEVICE AT +25 C & +125 C TEMPERATURE, SUBGROUPS 1, 2, 7 & 8.

Note 2: SCREEN TESTED 100% ON EACH DEVICE AT +25 C TEMPERATURE ONLY, SUBGROUP A9.

(Continued)

- Note 3: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25 C & +125 C TEMPERATURE, SUBGROUPS A1, 2, 7 & 8.
- Note 4: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25 C & +125C TEMPERATURE, SUBGROUPS A9 & 10.
- Note 5: TRANSMISSION LINE DRIVING TEST, 2 MSEC DURATION MAX.
- Note 6: GUARANTEED BUT NOT TESTED. (DESIGN CHARACTERIZATION DATA ONLY).
- Note 7: +25 C & +125 C MIN LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MINIMUM LIMITS.
- Note 8: MAX NUMBER OF OUTPUTS DEFINED AS (N). DATA INPUTS ARE DRIVEN 0V TO 3V. ONE OUTPUT AT VOL.
- Note 9: MAX NUMBER OF DATA INPUTS (N) SWITCHING. (N-1) INPUTS SWITCHING 0V TO 3V. INPUT-UNDER-TEST SWITCHING: 3V TO THRESHOLD(VILD), 0V TO THRESHOLD(VIHD), FREQ = 1MHZ.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
1A0	M0000519	12/11/98	Linda Collins	Initial Release to MDS:: MNSCAN18540T-X Rev. 1A0