OCTAL BUFFER/ LINE DRIVER

SCL541

(SC9029-0)

DATA SHEET

Version 1.0, AUG 2022

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PRODUCT DESCRIPTION:

SC9029-0 is radiation hardened non-inverting Octal buffer / Line driver have three state output. It is pin compatible to HCT541. The output enable pins (OE1 and OE2) control the three-state outputs. If either enable signal is high the outputs will be in the high impedance state. For data output both enables (OE1 and OE2) must be low.

Device is designed in180nm (TS18SL) CMOS technology. The device can operate over a large temperature range from -55°C to +125°C. Device is packaged in a hermetic sealed 20-pin ceramic dual Flat pack.

FEATURES:

- **5V± 0.5V Power Supply**
- **Cold Sparing feature at Input pins**
- **Three state outputs**
- **Low Power Dissipation, I_{DD} (Max.) <1mA**
- **Balanced Propagation Delays. $t_{PLH}=t_{PHL}$**
- **Symmetrical Output Impedance $I_{OH}=I_{OL}$ = 8 mA**
- **Operating Temperature:-55ºC to 125ºC.**
- **SEL immune LET up to 70 MeV.cm²/mg.**
- **SET immune LET up to 70 MeV.cm²/mg**
- **Pin compatible with HCTS541**
- **20-Pin Ceramic-Dual-Flat package**

PIN CONFIGURATION:

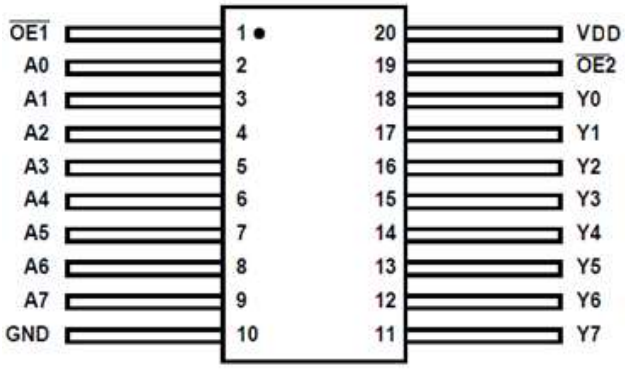

Figure: Device / Package Pin

PIN DESCRIPTION:

SYMBOL	PIN	DESCRIPTION
A0 to A7	2, 3,4, 5,6, 7,8, 9	Input
Y0 to Y7	18, 17, 16, 15, 14, 13, 12, 11	Output
V_{DD}	20	Supply Voltage
GND	10	Ground(0V)
OE1,OE2	1,19	Control pins

Table: Package Pin Description

FUNCTIONAL TABLE:

INPUTS			OUTPUT
OE1	OE2	An	Yn
L	L	H	H
L	L	L	L
H	X	X	Z
X	H	X	Z

Table: Truth table

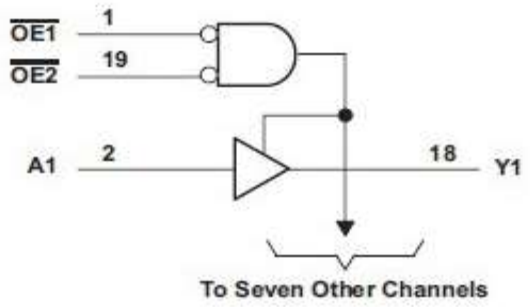

Figure: Logic Diagram

ABSOLUTE MAXIMUM RATINGS (1):

Over operating free-air temperature range (unless otherwise specified),

Parameter	Symbol	Ratings
Supply Voltage Range	V_{DD}	–0.5V to 6.5V
Input/ Output Voltage Range	V_{IO}	–0.5V to 6.5V
Max. Junction Temperature	T_J	150°C
Storage Temperature Range	T_{STG}	–65°C to 150°C

Table: Absolute maximum rating

(1) Stresses beyond those listed under *absolute maximum ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *recommended operating conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

RECOMMENDED OPERATING CONDITIONS:

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{DD}	Supply Voltage	4.5	5	5.5	V
V_{IH}	High Level Input Voltage	2.25	-	-	V
V_{IL}	Low Level Input Voltage	-	-	0.4	V
T_A	Operating Free Air Temperature	-55	25	+125	ºC

Table: Recommended operating condition

DC ELECTRICAL SPECIFICATIONS:

V_{DD} = 5.0± 0.5V, V_{SS}=0V, T_{AMB}=-55°C to +125°C (unless otherwise specified)

Symbol	Parameter	Test Conditions	Test Results			Units
			Min	Typ.	Max	
I_{IH}/ I_{IL}	Input Leakage Current	V_{DD}=5.5V V_{IN} = V_{DD} or 0V	-1	-	+1	uA
I_{OZH}/ I_{OZL}	HighZ Output Leakage Current	V_{DD}=5.5V, OE1= OE2= V_{DD} V_{IN} = V_{DD} or 0V V_{OUT} = V_{DD} or 0V	-5	-	+5	uA
$I_{OFF,IN}$	Cold spare Input Leakage Current	V_{DD}=0V V_{IN} = 5.5Vor 0V	-10	-	+10	uA
I_{DD}	Static Supply Current (No Load)	V_{DD}=5.5V V_{IN} = V_{DD} or VSS	-	0.66	10	uA
	Static Supply Current (Output Disabled)	V_{DD}=5.5V V_{IN} = V_{DD} or VSS OE1= OE2= V_{DD}	-	0.32	10	uA
V_{OH}	High Level Output Voltage (No Load)	V_{DD}=4.5V V_{IN}=V_{IH} = 2.25V I_{OH} = -50uA	V_{DD}-0.1	4.49	V_{DD}	V
V_{OH}	High Level Output Voltage (With Load)	V_{DD}=4.5V I_{OH} =-4mA	V_{DD}-0.4	4.38	V_{DD}	V
		V_{DD}=4.5V I_{OH} = -8mA	V_{DD}-0.4	4.27	V_{DD}	
V_{OL}	Low Level Output Voltage (No Load)	V_{DD}= 4.5V V_{IN}= V_{IL} = 0.8V I_{OL} = 50uA	V_{SS}	0.005	0.1	V
V_{OL}	Low Level Output Voltage (With Load)	V_{DD}=4.5V V_{IN}= V_{IL} = 0V I_{OL} = 4mA	V_{SS}	0.08	0.4	V
		V_{DD}=4.5V V_{IN}= V_{IL} = 0V I_{OL} = 8mA	V_{SS}	0.16	0.4	
Functional Test		V_{IN} = V_{SS} or V_{DD} V_{OL}=0.10* V_{DD} V_{OH}=0.90* V_{DD}	-	-	1	MHz

Table: DC Electrical Specification

AC ELECTRICAL SPECIFICATIONS:

Test condition:

V_{DD}=4.5V, V_{IN}=0V or 4.5V @1 MHz, R_L = 500E, C_L = 50pF, T_A = -55ºC to 125ºC,

Parameter	Symbol	From	To	Test Results			Units
				Min.	Typ.	Max.	
Propagation Delay	t_{PLH}	A	Y	1	3.18	15	ns
	t_{PHL}			1	4.67	15	ns
Output enable time	t_{PZH}	$\overline{OE}$	Y	-	7.00	-	ns
	t_{PZL}			-	4.66	-	ns
Output disable time	t_{PHZ}	$\overline{OE}$	Y	-	29.0	-	ns
	t_{PLZ}			-	27.0	-	ns

Table: AC Electrical Specification

Propagation Delay (t_{PLH} / t_{PHL}):

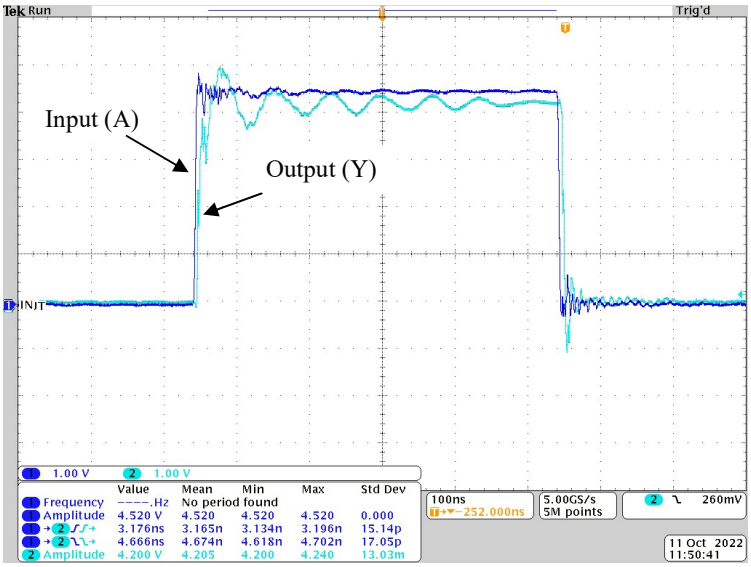

Figure: Propagation Delay waveform

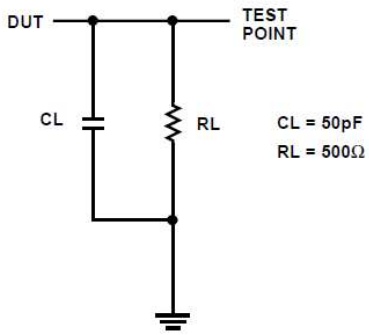

Figure: O/P Load Circuit for Delay

HighZ Propagation Delay (t_{PHZ} / t_{PZH}):

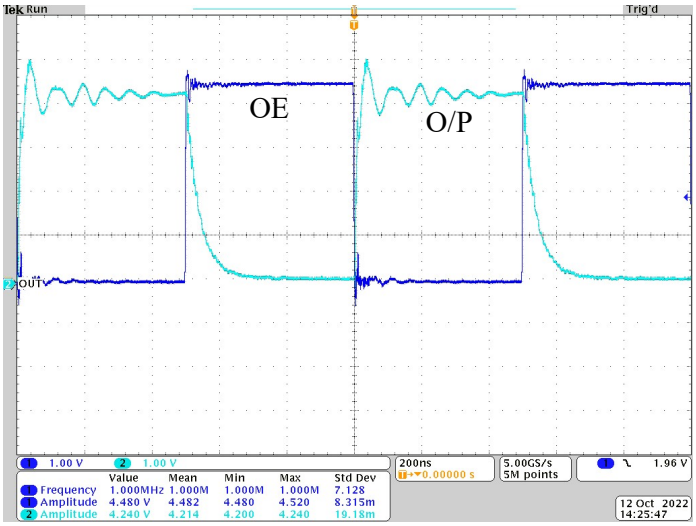

Figure: HighZ Propagation Delay

VDD	VIN	VZ
4.5V	4.5V	0V

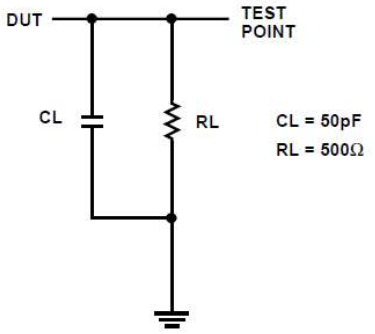

Figure: O/P Load Circuit for Delay

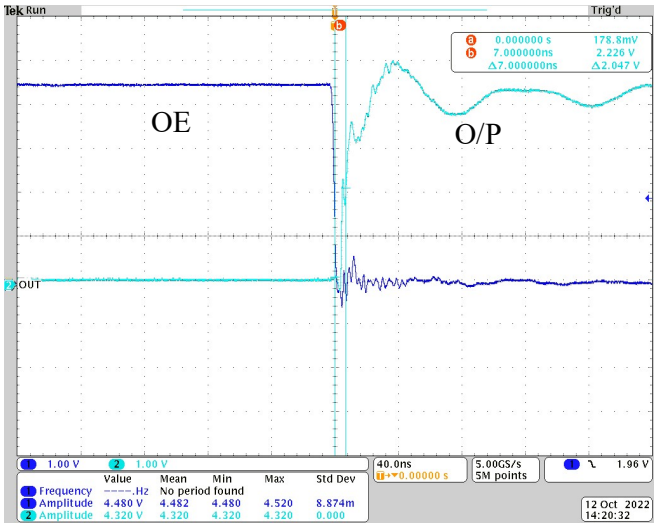

Figure: Propagation Delay (t_{PZH})

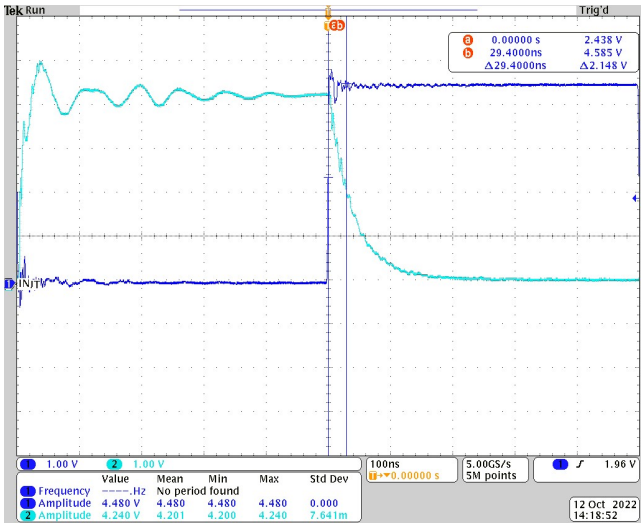

Figure: Propagation Delay (t_{PHZ})

HighZ Propagation Delay (t_{PLZ} / t_{PZL}):

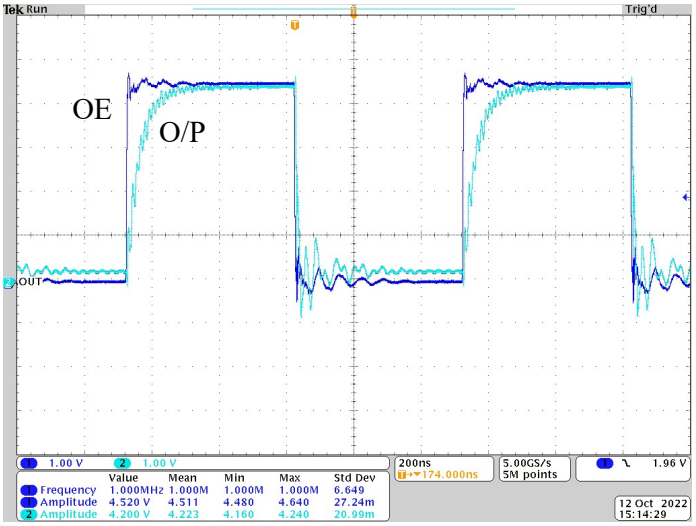

Figure: HighZ Propagation Delay

VDD	VIN	VZ
4.5V	0V	4.5V

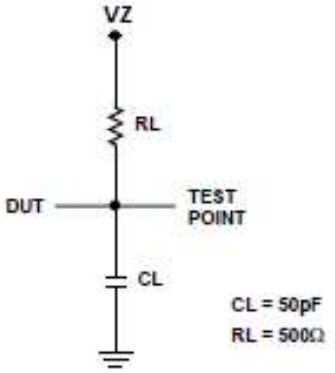

Figure: O/P Load Circuit for Delay

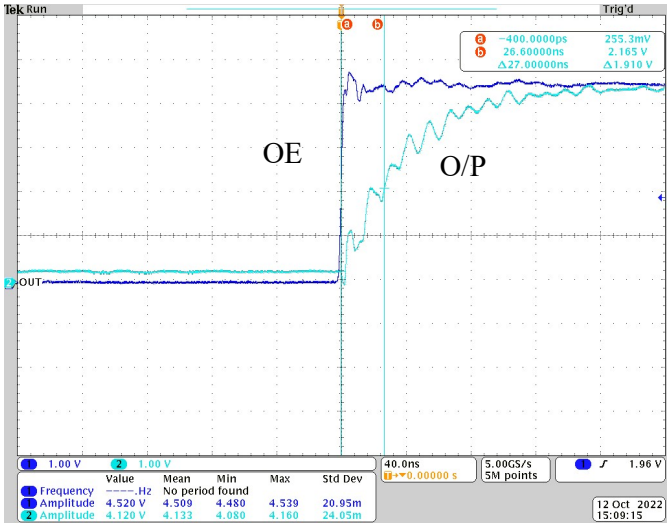

Figure: Propagation Delay (t_{PLZ})

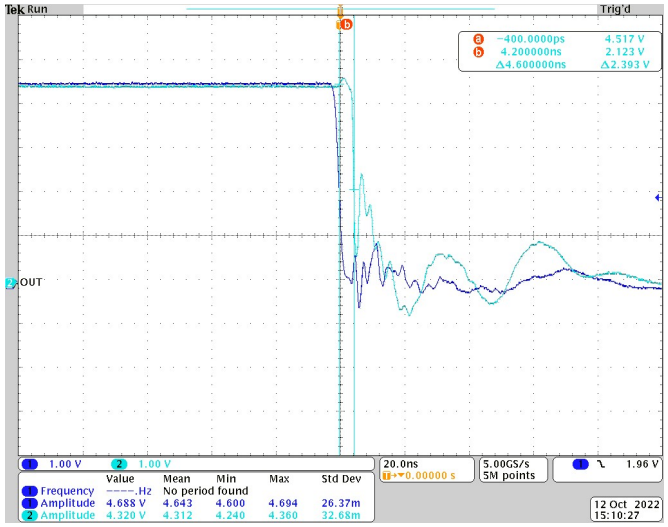

Figure: Propagation Delay (t_{PZL})

RADIATION CHARACTERISTICS:

❖ Total Ionization Dose (TID) Testing

Radiation Type	Characteristics	Value	Unit
TID	High-dose rate (50 - 300 rad /sec) up to	150	kRad

Test Conditions: V_{DD}=5.5V, V_{IN}=V_{DD}, Outputs = Float

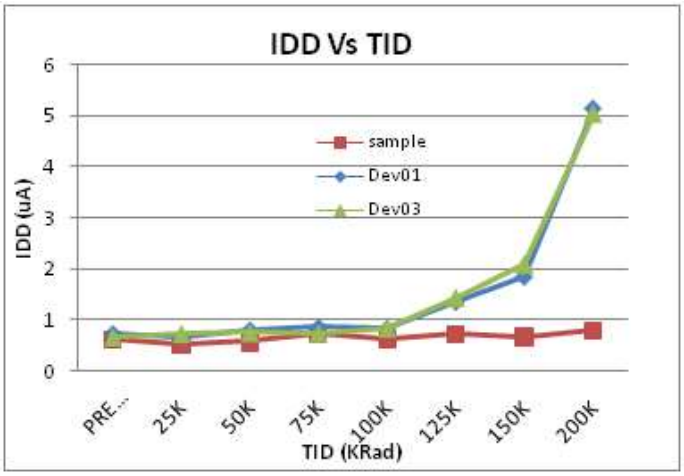

Figure: Supply Current Vs TID

❖ Single Event Effect (SEE) Testing

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Radiation Type	Characteristics	Value	Unit
Heavy ions	SEL immune up to:	70	MeV-cm^2/mg
	SET immune up to:	70	

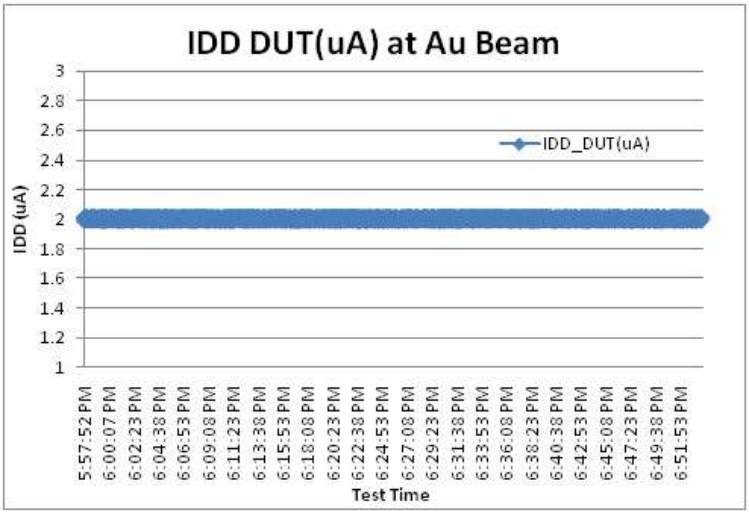
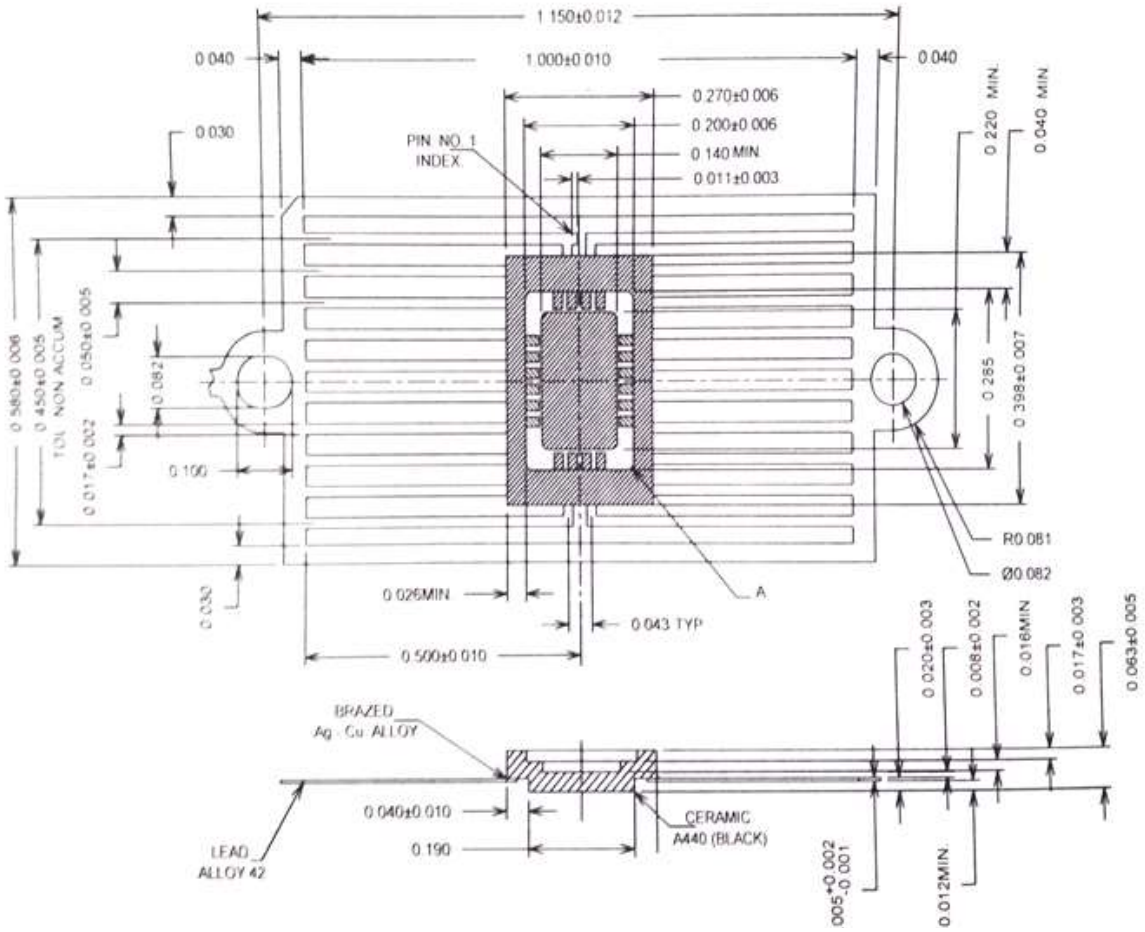


Figure: DUT Current Monitoring at LET-70 MeV-cm2/mg

PACKAGE DRAWING (20-Pin Ceramic-Dual-Flat pack)



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