

VS610K/T

MIL-STD-1397 NTDS

LINE DRIVER/RECEIVER

T-75-45-01

FEATURES

- Meets MIL-STD-1397 Types B and C
- Output Short Circuit Protection
- Available in 24-Pin LCC and CERDIP
- Military Temperature Range -55°C to +125°C

DESCRIPTION

This device is selectable for MIL-STD-1397A type B (NTDS Fast) or type C (ANEW) I/O Interface of standard digital data for Naval systems.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage Range:

V _{EE}	+0.5V to -7.0V
V _{CC}	-0.5V to +7.0V
V ₊	-0.5V to +7.0V
V _{C-}	+0.5V to -7.0V
V _{B-}	-7.0V to +7.0V

Input Voltages:

DRAI, DRBI, DRCI	-1.5V to +5.5V
RCAI+, RCBI+, RCCI+	-10V to +10V
RCAI-, RCBI-, RCCI-	-10V to +10V
(RCXI+) - (RCXI-)	-10V to +10V
OE, B/C(COM)	-1.5V to +5.5V

Operating Temperature Range:

Commercial	(VS610K) 0°C to 70°C
Military (Note 1)	(VS610T) -55°C to 125°C

Storage Temperature Range

Note 1: Power derating above T_A = 70°C to be based on a maximum junction temperature of 150°C and the thermal factors of $\theta_{JC} = 57.5^\circ\text{C/W}$ and $\theta_{JA} = 106^\circ\text{C/W}$.

RECOMMENDED OPERATING CONDITIONS

High Level Input Voltage (V _{IH})	2.0V Min.
Low Level Input Voltage (V _{IL})	0.7V Max

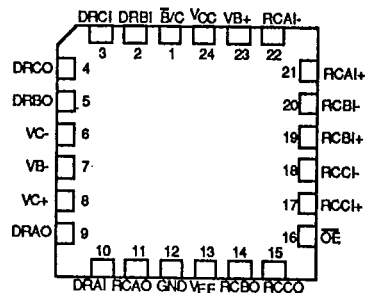
Supply Voltages	Type B	Type C
V ₊	OV (GND)	N/C
V _{C-}	N/C	OV (GND)
V _{EE}	-4.5V to -5.5V	-4.5V to -5.5V
V _{CC}	+4.5V to +5.5V	+4.5V to +5.5V
V _{B-}	-4.5V to -5.5V	+4.5V to +5.5V (thru 100Ω resistor)
B/C	OV (GND)	+4.5V to +5.5V (thru 1KΩ resistor)

PACKAGE TYPES AVAILABLE

- 24-Pin Plastic DIP
- 24-Pin CERDIP
- 24-Pin LCC
- 28-Pin CLCC (CERQUAD)

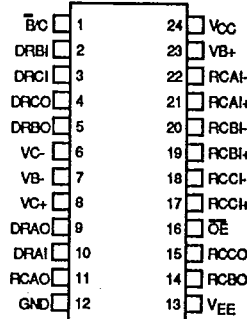
CONNECTION DIAGRAMS

Leadless Chip Carrier Package



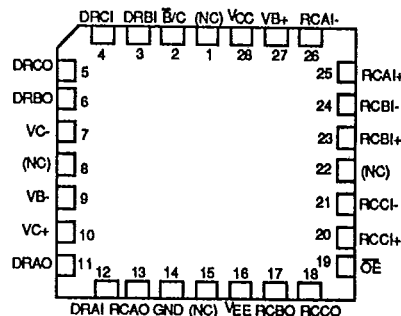
Top View

CERDIP Package



Top View

PLCC/CLCC Package



Top View

LSP FAMILY DATA
SHEETS

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ELECTRICAL CHARACTERISTICS $V_{CC} = +5V \pm 10\%$, $T_A = -55^\circ$ to 125°C (unless otherwise specified)

DRIVER SECTION MIL - STD - 1397A			LIMITS VS610T		
PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS
Input Low Voltage	V_{IL}			0.7	Volts
Input High Voltage	V_{IH}		2.0		Volts
Output Low Voltage	V_{OL1} (ANEW)	$V_+ = 4.5V$; $V_- = \text{GND}$; $V_{IN} = 2.0V$; $I_{OL} = 40\text{mA}$; $V_{CC} = 4.5V$		0.45	Volts
	V_{OL2} (FAST)	$V_+ = \text{GND}$; $V_{CC} = 4.5V$; $V_{IN} = 0.7V$; $V_- = -4.5V$; $I_{OL} = 0.5\text{mA}$		-3.0	Volts
Output High Voltage	V_{OH1} (ANEW)	$V_+ = 4.5V$; $V_- = \text{GND}$; $V_{IN} = 0.7V$; $I_{OH} = -27\text{mA}$; $V_{CC} = 4.5V$	2.7		Volts
	V_{OH2} (FAST)	$V_+ = \text{GND}$; $V_{CC} = 4.5V$; $V_{IN} = 2.0V$; $V_- = -4.5V$; $I_{OH} = -1.5\text{mA}$	-0.5		Volts
Input Current	I_I	$V_{CC} = 5.5V$; $V_I = 5.5V$		0.1	mA
High-Level Input Current	I_{IH}	$V_{CC} = 5.5V$; $V_{IH} = 2.7V$		20	μA
Low-Level Input Current	I_{IL}	$V_{CC} = 5.5V$; $V_{IL} = 0.4V$		-0.4	mA
Input Clamp Voltage	V_{IK}	$V_{CC} = 5.5V$; $I_{IN} = -18\text{mA}$		-1.5	Volts
Transition Low to High	t_{PLH1}	Type C; $V_{CC} = 5.0V$; $V_{EE} = -5.0V$	$T_A = 25^\circ\text{C}$	75	ns
			$T_A = -55^\circ$ to $+125^\circ\text{C}$	100	
Transition High to Low	t_{PHL1}	Type C; $V_{CC} = 5.0V$; $V_{EE} = -5.0V$	$T_A = 25^\circ\text{C}$	75	ns
			$T_A = -55^\circ$ to $+125^\circ\text{C}$	100	
Transition Low to High	t_{PLH2}	Type B; $V_{CC} = 5.0V$; $V_{EE} = -5.0V$	$T_A = 25^\circ\text{C}$	75	ns
			$T_A = -55^\circ$ to $+125^\circ\text{C}$	100	
Transition High to Low	t_{PHL2}	Type B; $V_{CC} = 5.0V$; $V_{EE} = -5.0V$	$T_A = 25^\circ\text{C}$	75	ns
			$T_A = -55^\circ$ to $+125^\circ\text{C}$	100	
Rise Time	t_R		10	40	ns
Fall Time	t_F		5	40	ns
Output Impedance	R_{OUT}	$V_{EE} = V_{CC} = V_{B+} = V_{C+} = V_{B-} = V_{C-} = 0V$; $-7V \leq V_{OUT} \leq 7V$	100k		Ω

ELECTRICAL CHARACTERISTICS $V_{CC} = 5V \pm 10\%$; $V_{EE} = -5V \pm 10\%$; $T_A = -55^\circ\text{C}$ to $+125^\circ\text{C}$ (unless otherwise specified)

SUPPLY CURRENTS			LIMITS VS610K		UNITS
TEST	SYMBOL	CONDITIONS	TYP	MAX	
TYPE B	I_{CC}		25	50	mA
	I_{EE}		-50	-75	mA
	I_{B-}		-20	-50	mA
TYPE C	I_{CC}		25	50	mA
	I_{EE}		-50	-75	mA
	I_{C+}		20	45	mA
	I_{B-}			1.5	mA

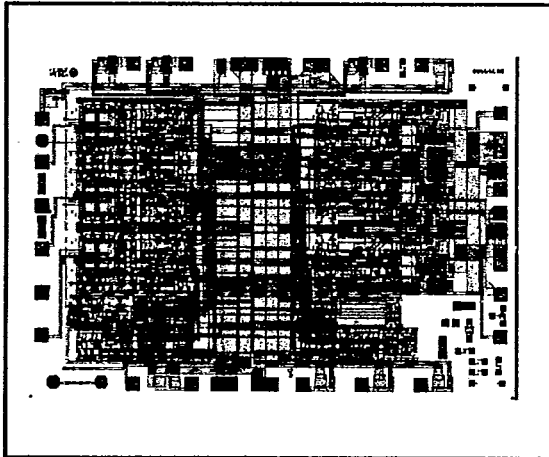
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ELECTRICAL CHARACTERISTICS (continued)

$V_{CC} = +5V \pm 10\%$, $V_{EE} = -5V \pm 10\%$, $T_A = -55^\circ$ to $125^\circ C$ (unless otherwise specified)					
RECEIVER SECTION			LIMITS VS610T		
PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS
Output Low Voltage	V_{OL}	$V_{CC} = 4.5V$; $V_{EE} = -5V$; $V_{DIFF} = 2.0V$; $I_{OL} = 8mA$		0.4	Volts
Output High Voltage	V_{OH}	$V_{CC} = 4.5V$; $V_{EE} = -5V$; $V_{DIFF} = 1.0V$; $I_{OH} = -400\mu A$	2.5		Volts
Short Circuit Protection	I_{OS}	$V_{CC} = 5.5V$; not to exceed one second	-20	-130	mA
Differential Input Threshold Voltage	V_{TH1}	Receiver Input+ = V_{IN} Receiver Input- = GND (Fast)	-1.9	-1.1	Volts
	V_{TH2}	Receiver Input+ = V_{IN} Receiver Input- = GND (ANEW)	0.8	2.2	Volts
+ Input Forward Current	$I_F (+Input)$	$V_{CC} = 5.0V$; $V_{EE} = -5.0V$; -Input = GND; $V_F = +5V$		2.5	mA
- Input Forward Current	$I_F (-Input)$	$V_{CC} = 5.0V$; $V_{EE} = -5.0V$; -Input = GND; $V_F = +5V$		-2.5	mA
Output Hi-Z Output Current	I_{OZ}	$V_{CC} = 5.5V$; $V_{IH} = 2.0V$; $V_O = 0.4$ to $2.7V$	-20	+20	μA
Common Mode Voltage	V_{CM}	$V_{CM} = 5.0V$; $V_{EE} = -5.0V$; $V_{DIFF} = 1.3V$ to $1.7V$	-7.5	+7.5	Volts
Tristate Enable Time	T_{PZH}	$V_{CC} = +5.0V$ $V_{EE} = -5.0$		75	ns
	T_{PZL}	$V_{CC} = +5.0V$ $V_{EE} = -5.0$		75	ns
Tristate Disable Time	T_{PHZ}	$V_{CC} = +5.0V$ $V_{EE} = -5.0$		40	ns
	T_{PLZ}	$V_{CC} = +5.0V$ $V_{EE} = -5.0$		40	ns
Propagation Delay	T_{PLH}	$V_{CC} = +5.0V$ $V_{EE} = -5.0$	$T_A = 25^\circ C$	75	ns
			$T_A = -55^\circ C$ to $+125^\circ C$	100	ns
	T_{PHL}	$V_{CC} = +5.0V$ $V_{EE} = -5.0$	$T_A = 25^\circ C$	75	ns
			$T_A = -55^\circ C$ to $+125^\circ C$	100	ns

LSP FAMILY DATA SHEETS

DIE

Die size = 0.150 X 0.180 inch (27,000 sq. mils)
= 3.81 X 4.57mm (17.41 sq. mm)

DICE POLICY**Electrical Characteristics**

Each die is electrically tested to the military grade DC parameters to guard band limits at $25^\circ C$ to guarantee operation over the full temperature range.

Quality Assurance

All dice are 100% visually inspected to the requirement of MIL-STD-883C, Method 2010.2, Condition 3.

All dice are glass passivated with only the bonding pads exposed to provide scratch protection.

All dice are provided with gold backing.

Shipping Packages/Order Information

All dice are packaged in die crates with individual compartments which prevent damage to the die during shipping. Minimum order for dice is 100, supplied only in multiples of 100.

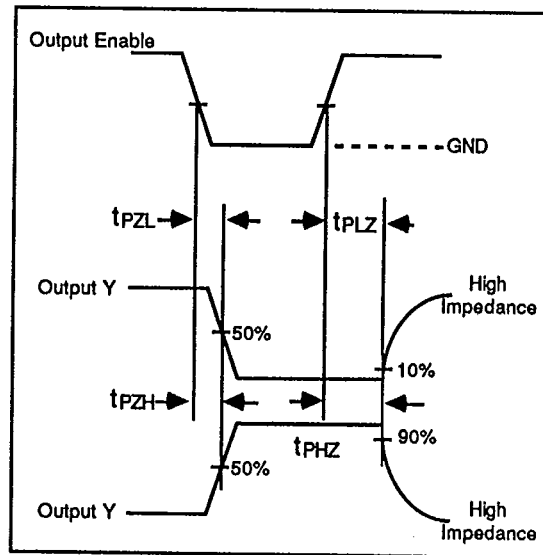
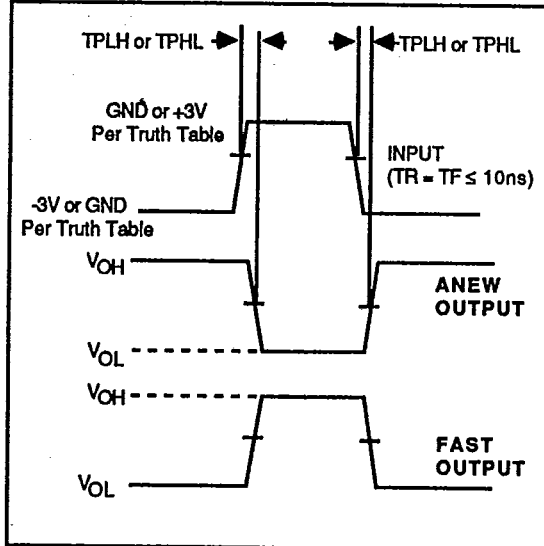
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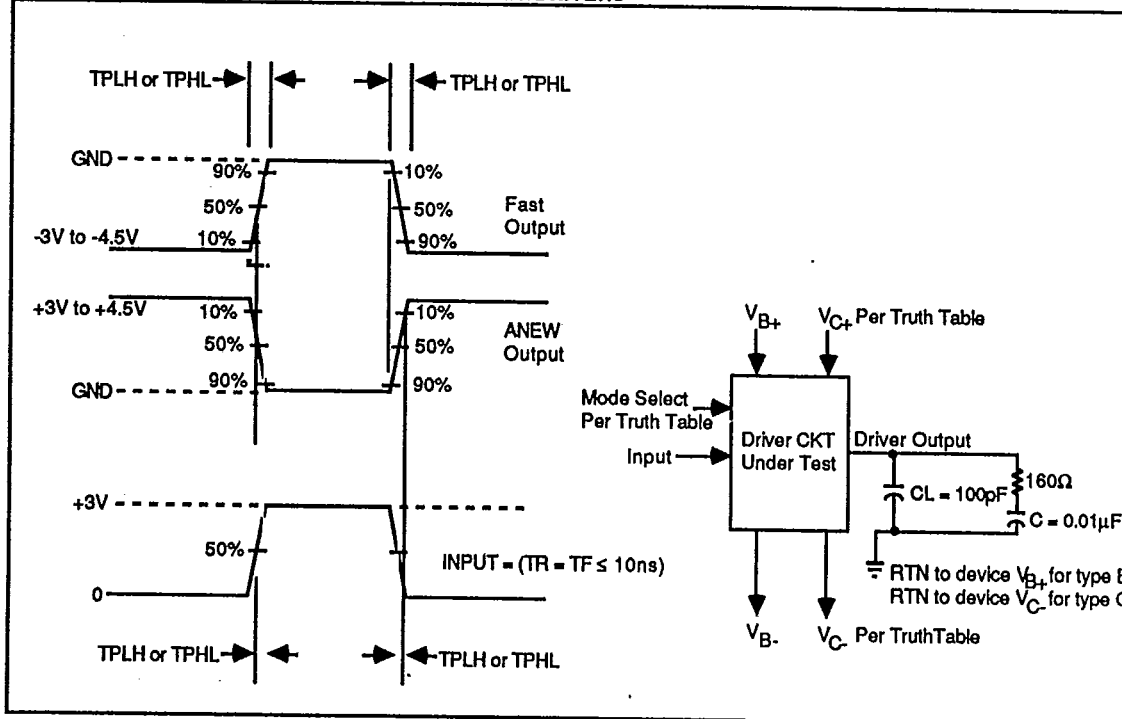
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VOLTAGE WAVEFORMS/RECEIVERS



AC TEST CIRCUIT AND VOLTAGE WAVEFORMS/DRIVERS



DRIVER SECTION

$\overline{B/C}$ (TTL)	DRIVER INPUT (TTL)	DRIVER OUTPUT	
		B	C
0	1 (Source Current from VB+)	1 (Note 1)	-
0	0 (Sink Current to VB-)	0 (Note 1)	-
1	1 (Sink Current to VC-)	-	1 (Note 2)
1	0 (Source Current from VC+)	-	0 (Note 2)

Notes: 1. Fast "1" = 0V, "0" = -3V, VB+ = GND, VB- = -5V, VC- = N/C, VC+ = N/C

2. ANEW "1" = 0V, "0" = 3.5V, VC+ = +5V, VB- = +5V thru 100 Ω , VC- = GND, VB+ = N/C

RECEIVER SECTION

$\overline{OE}$ (TTL)	$\overline{B/C}$ (TTL)	RECEIVER INPUT (Note 1)	RECEIVER OUTPUT
0	0	More Negative Than -1.9V	0
0	0	More Positive Than -1.1V	1
0	1	> +2.2V	0
0	1	< +0.8V	1
0	X (Note 2)	Open	0
1	X (Note 2)	X (Note 2)	Hi-Z

Notes: 1. Referenced (+) to (-)

2. X = Don't Care

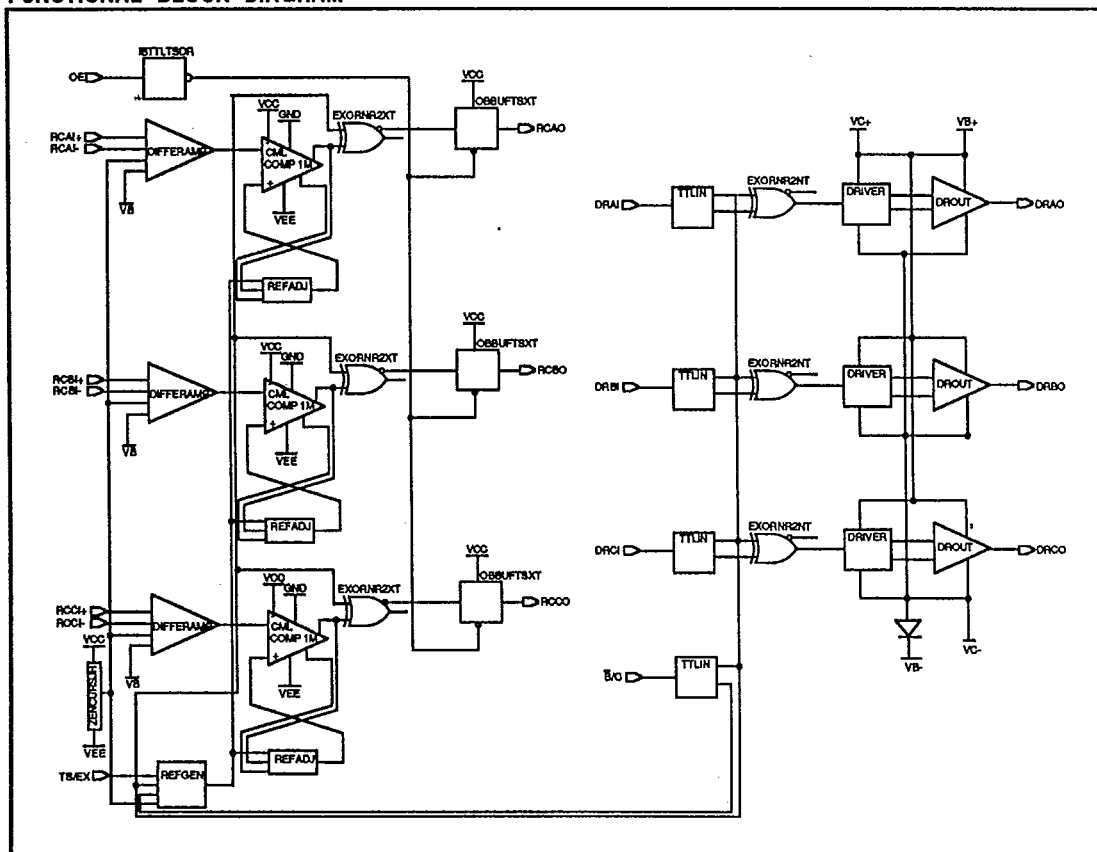
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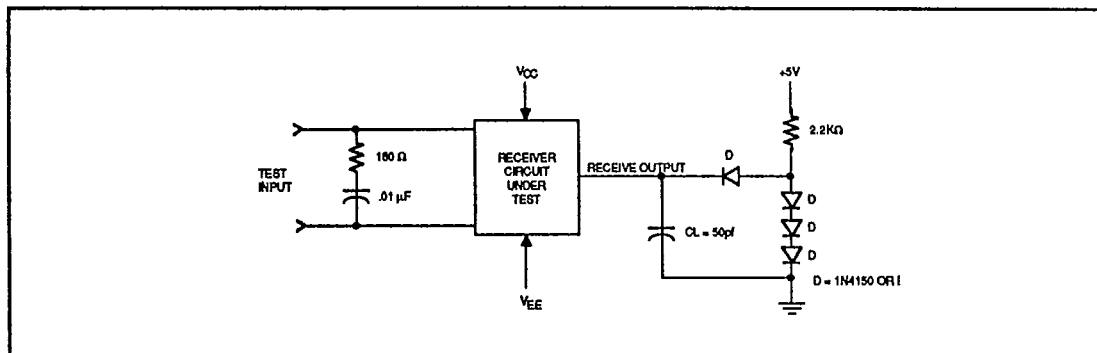
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FUNCTIONAL BLOCK DIAGRAM



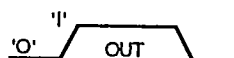
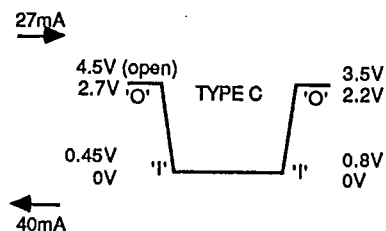
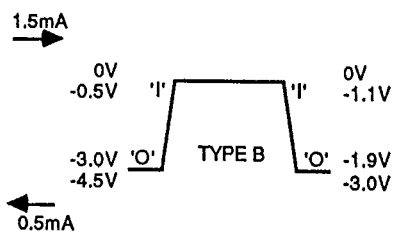
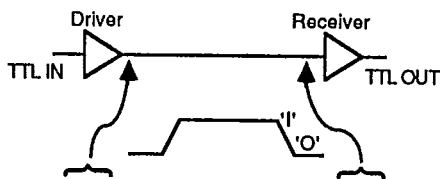
AC TEST CIRCUIT/RECEIVERS



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	TYPE B (NTDS FAST)	TYPE C (ANEW)
Logic Level (nominal)		
'0'	-3V	+3.5V
'1'	0V	0V
Threshold (VDC)	-1.5 ± 0.4	$+1.5 \pm 0.4$
Transfer Rate (WPS)	250,000	250,000
RECEIVER		
Type	Differential	Differential
Transient Suppression	—	—
Input Open - Output	Logic 0	Logic 0
Input (ma)		
'1' IN	1.5mA Max.	2.5mA Max.
'0' IN	0.5mA Max.	2.5mA Max.
Common Mode Range	$\pm 7.5V$	$\pm 6.0V$
Termination		
R	150 to 180 Ω	110 to 160 Ω
C	6800 to 10,000pf	6800 to 10,000pF
Matched Z_{IN} tot	—	$\pm 8\%$
DRIVER		
Type	Single Ended	Single Ended
Load	—	—
Source Logic 1	-1.5mA @ Logic 1	-27mA @ Logic 0
Sink Logic 0	0.5mA @ Logic 0	40mA @ Logic 1
Rise and Fall Time	100ns Max.	100ns Max.
Power Off, Z_{OUT}	$>100K\Omega$	$>100K\Omega$
LINE		
Z_o	100 Ω to 180 Ω	100 Ω to 180 Ω



LSP FAMILY DATA SHEETS

