



VS610/VJS610

MIL-STD-1397 NTDS
LINE DRIVER/RECEIVER

T-75-45-07

FEATURES

- Meets MIL-STD-1397 Types B and C
- Output Short Circuit Protection
- Available in 24-Lead CERDIP and LCC packages
- Military Screened Part Available

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:

VEE	+0.5V to -7.0V
VCC	-0.5V to +7.0V
V+	-0.5V to +7.0V
VC-	+0.5V to -7.0V
VB-	-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 (VS610)	0°C to 70°C
Military (Note 1) (VJS610)	-65°C to 150°C

Storage Temperature

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

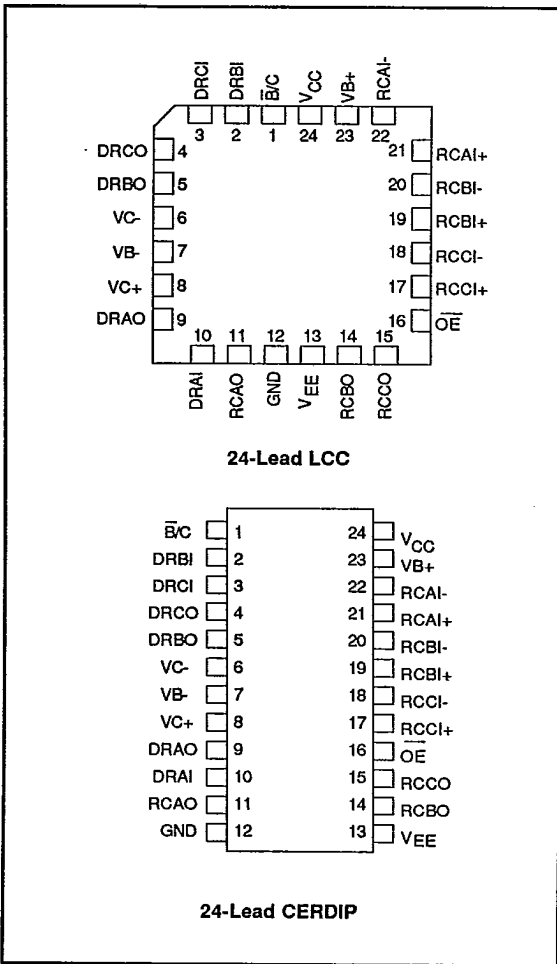
RECOMMENDING OPERATING CONDITIONS

High Level Input Voltage (V _{IH})	2.0V Minimum
Low Level Input Voltage (V _{IL})	0.7V Maximum

Supply Voltage Range:

VEE (Type B and C)	-4.5V to -5.5V
VCC (Type B and C)	+4.5V to +5.5V
VC+ (Type B)	N/C
VC+ (Type C)	+4.5V to +5.5V
VC- (Type B)	N/C
VC- (Type C)	0V (GND)
VB+ (Type B)	GND
VB+ (Type C)	N/C
VB- (Type B)	-4.5V to -5.5V
VB- (Type C)	+4.5V to +5.5V (thru 100Ω resistor)
B/C (Type B)	0V (GND)
B/C (Type C)	+4.5V to +5.5V (thru 1KΩ resistor)

CONNECTION DIAGRAMS



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

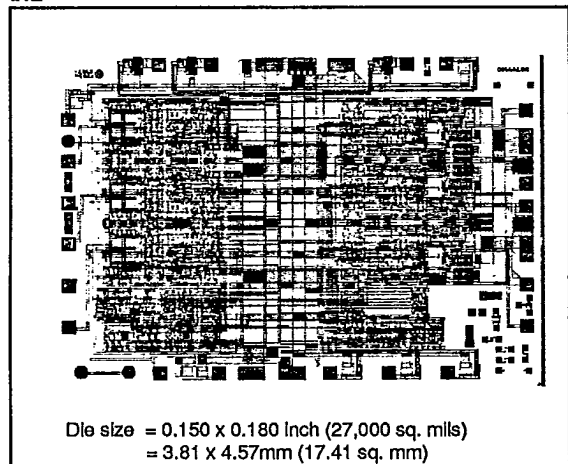
DRIVER SECTION			LIMITS VS610/VJS610		
PARAMETER	SYMBOL	CONDITIONS	MIN	MAX	UNITS
Input Low Voltage	V_{IL}			0.7	V
Input High Voltage	V_{IH}		2.0		V
Output Low Voltage	V_{OL1} (ANEW)	$I_{OL} = 40V$		0.45	V
	V_{OL2} (FAST)	$I_{OL} = 0.5mA$		-3.0	V
Output High Voltage	V_{OH1} (ANEW)	$I_{OH} = -27mA$	2.7		V
	V_{OH2} (FAST)	$I_{OH} = -1.5mA$	-0.5		V
Input Current	I_I	$V_I = 5.5V$		0.1	mA
High-Level Input Current	I_{IH}	$V_{IH} = 2.7$		20	μA
Low-Level Input Current	I_{IL}	$V_{IL} = 0.4V$		-0.4	mA
Input Clamp Voltage	V_{IK}	$V_{IN} = 18mA$		-1.5	V
Transition Low to High	T_{PLH1}			100	ns
Transition High to Low	T_{PHL1}			100	ns
Rise Time	t_R	Guaranteed but not tested	10	40	ns
Fall Time	t_F	Guaranteed but not tested	5	40	ns
Output Impedance	R_{OUT}	$V_{EE} = V_{CC} = V_{B+} = V_{C+} = V_{B-} = V_{C-} = 0V$; $-7V \leq V_{OUT} \leq 7V$	100		K Ω
RECEIVER SECTION			LIMITS VS610/VJS610		
Output Low Voltage	V_{OL}	$(V_{RCI+}) - (V_{RCI-}) = 2.0V$; $I_{OL} = 0.8mA$		0.4	V
Output High Voltage	V_{OH}	$(V_{RCI+}) - (V_{RCI-}) = 1.0V$; $I_{OH} = -400\mu A$	2.5		V
Short Circuit Protection	I_{OS}	$V_{CC} = 5.5V$; not to exceed one second	-20	-130	mA
Differential Input Threshold Voltage	V_{TH1} (FAST)	Receiver Input+ = V_{IN} , Receiver Input- = GND	-1.9	-1.1	V
	V_{TH2} (ANEW)	Receiver Input+ = V_{IN} , Receiver Input- = GND	0.8	2.2	V
+ Input Forward Current	I_F (+Input)	-Input = GND; $V_F = -5.5V$		2.5	mA
- Input Forward Current	I_F (-Input)	-Input = GND; $V_F = -5.5V$		-2.5	mA
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}	$V_{CC} = 5.0V$; $V_{EE} = -5.0V$; $V_{DIFF} = 1.3V$ to $1.7V$	-7.5	+7.5	V
Tristate Enable Time	T_{PZH}, T_{PZL}	$V_{CC} = +5.0V$ $V_{EE} = -5.0$		75	ns
Tristate Disable Time	T_{PHZ}, T_{PLZ}	$V_{CC} = +5.0V$ $V_{EE} = -5.0$		75	ns
Propagation Delay	T_{PLH}	$V_{CC} = +5.0V$ $V_{EE} = -5.0$		100	ns
	T_{PHL}	$V_{CC} = +5.0V$ $V_{EE} = -5.0$, Ambient Temperature = $25^\circ C$		75	ns

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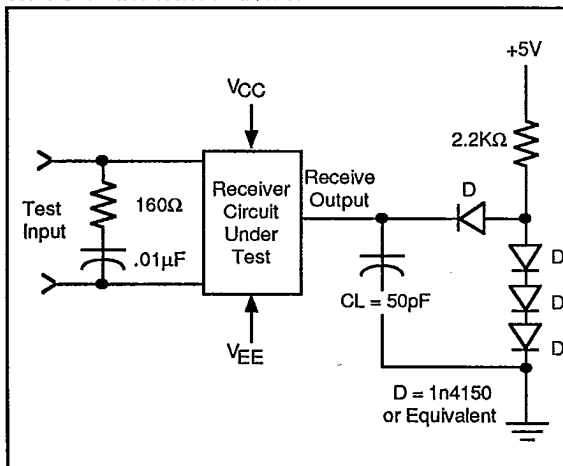
ELECTRICAL CHARACTERISTICS $V_{CC} = 5V \pm 10\%$; $V_{EE} = -5V \pm 10\%$; $T_A = -55^\circ C$ to $+125^\circ C$ (unless otherwise specified)

SUPPLY CURRENTS			LIMITS VS610L		
TEST	SYMBOL	CONDITIONS	TYP	MAX	UNITS
TYPE B	I_{CC}		50	60	mA
	I_{EE}		-50	-75	mA
	I_{B-}		-20	-50	mA
TYPE C	I_{CC}		-50	60	mA
	I_{EE}		-50	-75	mA
	I_{C+}		20	45	mA
	I_{B-}			1.5	mA

DIE



AC TEST CIRCUIT/RECEIVERS



DICE POLICY

Electrical Characteristics

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

Quality Assurance

All dice are 100% visually inspected to the requirement of MIL-STD-883, Method 2010, Condition B.

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

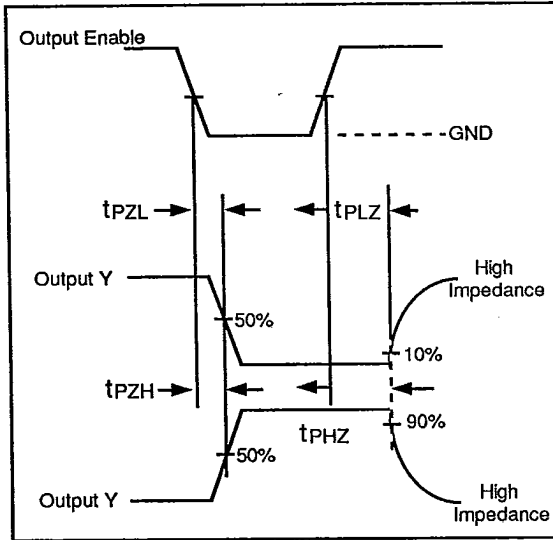
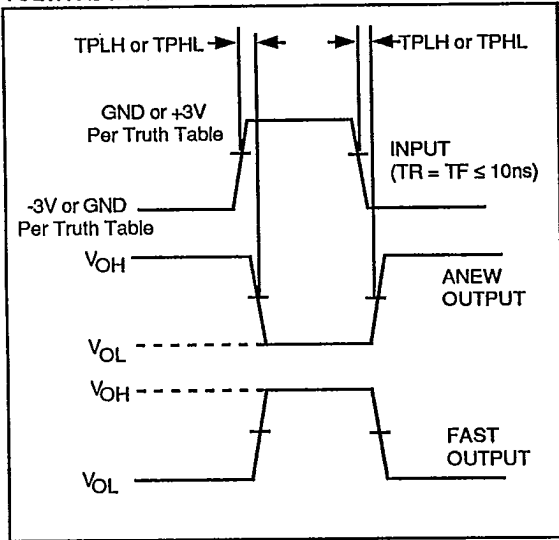
All dice are provided with gold backing.

Shipping Packages/Order Information

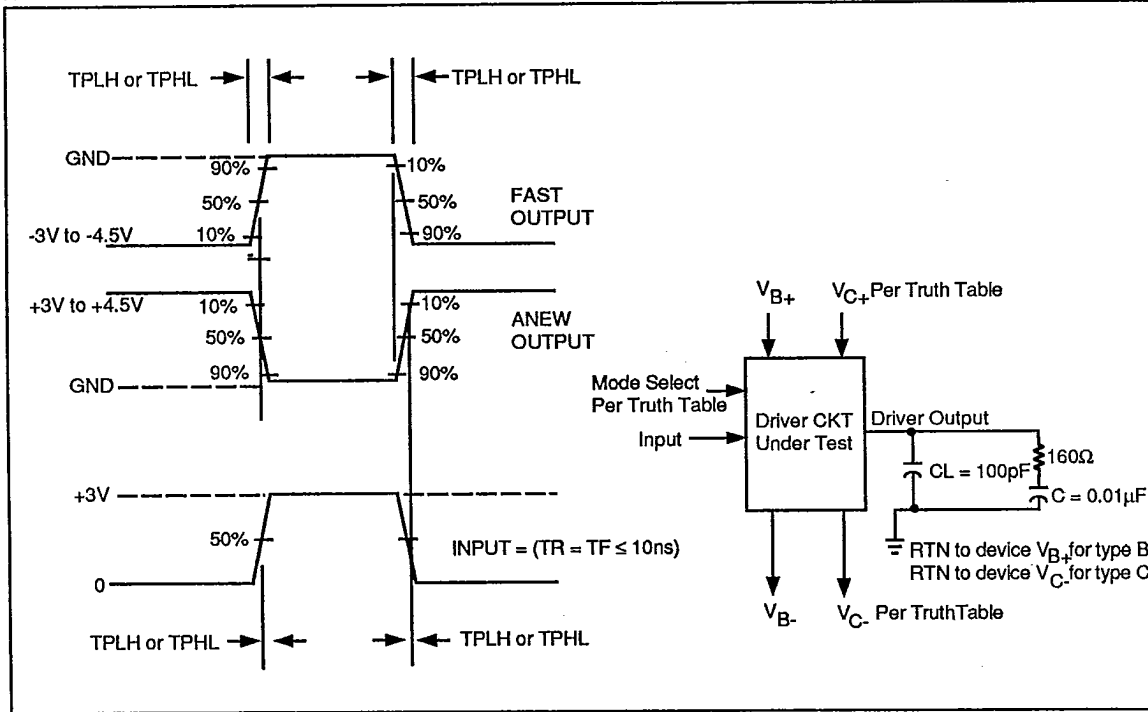
All dice are packaged in die crates with individual compartments which prevent damage to the die during shipping. Minimum order for dice is 100, supplied only in multiples of 100.

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VOLTAGE WAVEFORMS/RECEIVERS



AC TEST CIRCUIT AND VOLTAGE WAVEFORMS/DRIVERS



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DRIVER SECTION

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

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

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

RECEIVER SECTION

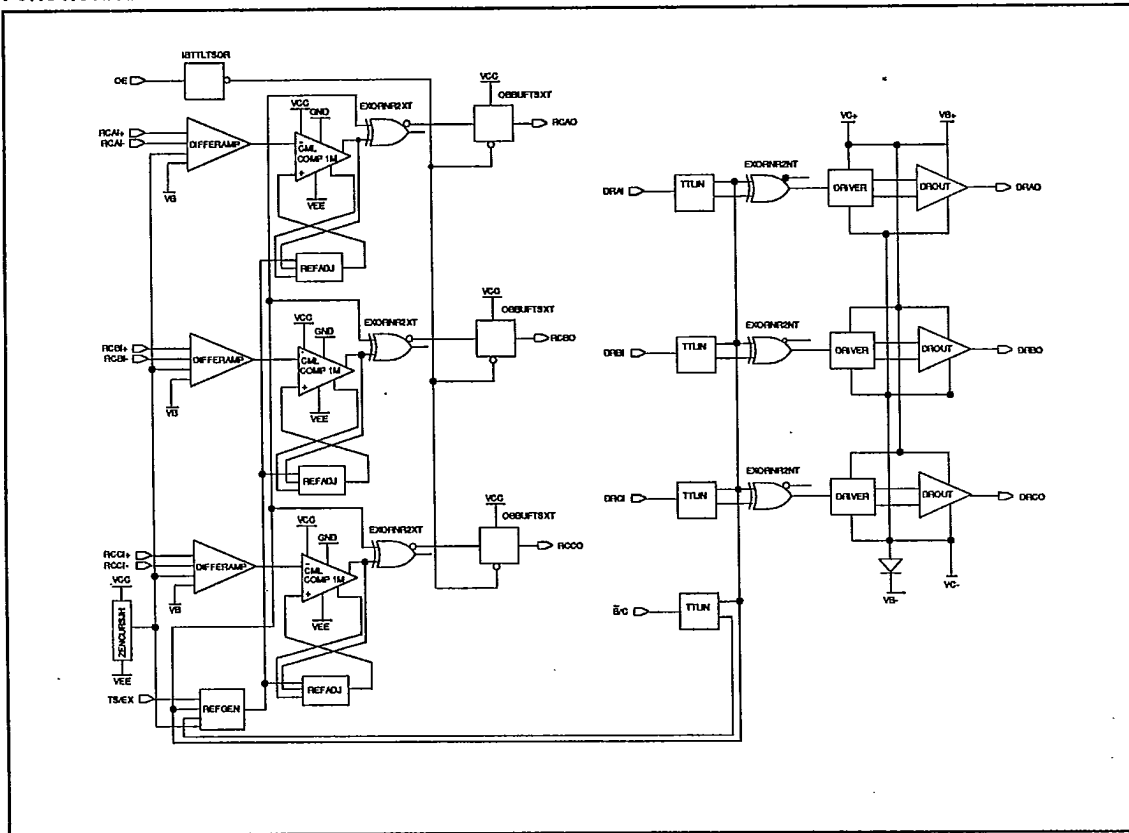
VB-	\overline{OE} (TTL)	\bar{B}/C (TTL)	RECEIVER INPUT (Note 1)	RECEIVER OUTPUT
-5V	0	0	More Negative Than -1.9V	0
-5V	0	0	More Positive Than -1.1V	1
+5V	0	1	> +2.2V	0
+5V	0	1	< +0.8V	1
X (Note 2)	0	X (Note 2)	Open	0
X (Note 2)	1	X (Note 2)	X (Note 2)	Hi - Z

Note 1: Referenced (+) to (-)

Note 2: X = Don't Care

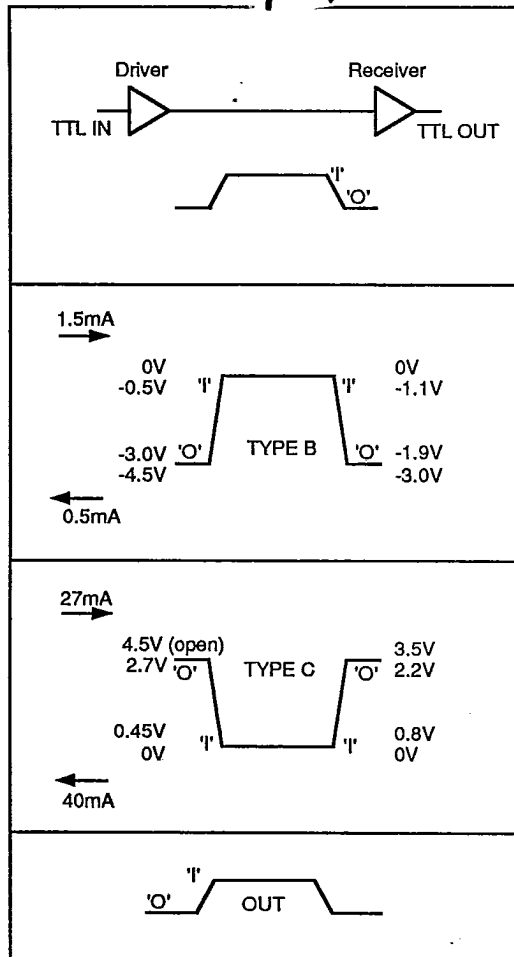
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FUNCTIONAL BLOCK DIAGRAM



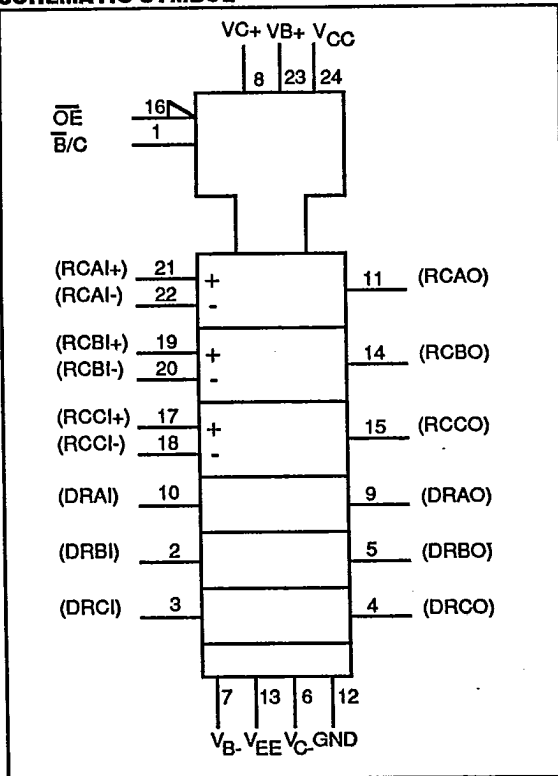
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	TYPE B (FAST)	TYPE C (ANEW)
Logic Level (nominal)		
"0"	-3V	+3.5V
"1"	0V	0V
Threshold (VDC)	-1.5 ± 0.4	+1.5 ± 0.4
Transfer Rate (WPS)	250,000	250,000
RECEIVER		
Type	Differential	Differential
Transient Suppression	—	—
Input Open - Output	Logic 0	Logic 0
Input (ma)		
"1" IN	1.5mA Max.	2.5mA Max.
"0" IN	0.5mA Max.	2.5mA Max.
Common Mode Range	±7.5V	±6.0V
Termination		
R	150 to 180Ω	110 to 160Ω
C	6800 to 10,000pF	6800 to 10,000pF
Matched Z _{IN} tot	—	±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}	>100KΩ	>100KΩ
LINE		
Z _o	100Ω to 180Ω	100Ω to 180Ω



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SCHEMATIC SYMBOL



PIN	SYMBOL	DESCRIPTION
1	$\overline{B/C}$	TTL-Input, Mode Select; NTDS Fast/ANEW
2	DRBI	TTL-Input, Driver C
3	DRCI	TTL-Input, Driver B
4	DRCO	NTDS Fast/ANEW Output Driver C
5	DRBO	NTDS Fast/ANEW Output Driver B
6	VC-	ANEW GND (Driver Return) (N/C for FAST)
7	VB-	FAST Driver Supply -5V(+5 thru 100Ω for ANEW)
8	VC+	Driver Source Supply +5V for ANEW, (N/C for Fast).
9	DRAO	NTDS Fast/ANEW Output Driver A
10	DRAI	TTL-Input Driver A
11	RCAO	TTL-Output Receiver A
12	GND	Ground
13	VEE	-5 Volts
14	RCBO	TTL-Output Receiver B
15	RCCO	TTL-Output Receiver C
16	\overline{OE}	Receiver Output Tri-State Enable
17	RCCI+	NTDS Fast/ANEW Receiver C Input
18	RCCI-	NTDS Fast/ANEW Receiver C Input
19	RCBI+	NTDS Fast/ANEW Receiver B Input
20	RCBI-	NTDS Fast/ANEW Receiver B Input
21	RCAI+	NTDS Fast/ANEW Receiver A Input
22	RCAI-	NTDS Fast/ANEW Receiver A Input
23	VB+	Fast GND (Driver Return) (N/C for ANEW)
24	VCC	+5 Volts

TYPE B NTDS FAST CONNECTION

VC- (Pin 6) NC
VC+ (Pin 8) NC
$\overline{B/C}$ (Pin 1) GND
VB+ (Pin 23) GND (Driver Return)
VB- (Pin 7) -5Volts

TYPE C NTDS ANEW CONNECTION

VC- (Pin 6) GND (Driver Return)
VB- (Pin 7) +5V thru 100Ω resistor
VC+(Pin 8) +5Volts
$\overline{B/C}$ (Pin 1) 1KΩ resistor to +5Volts
VB+ (Pin 23) NC