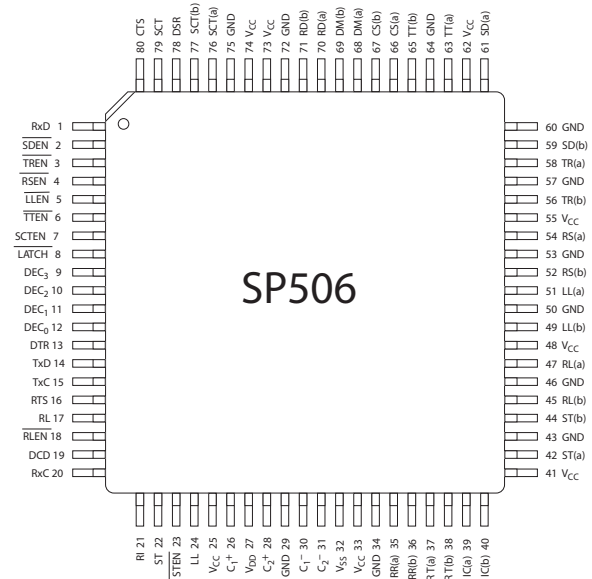




SP506

5V Single Chip WAN Multi-Mode Serial Transceiver

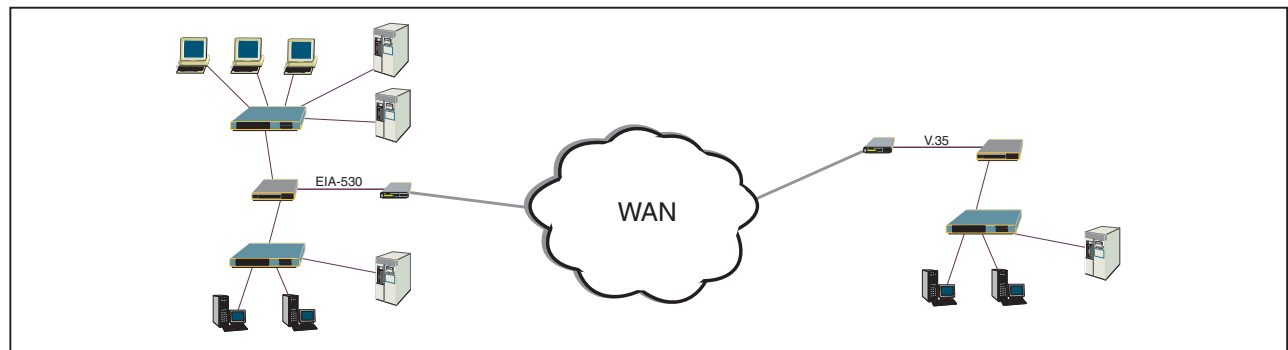
- Interface Modes Supported:
 - ✓ RS-232 (V.28) ✓ X.21/RS-422 (V.11)
 - ✓ EIA-530 (V.10 & V.11) ✓ EIA-530A (V.10 & V.11)
 - ✓ RS-449 (V.10 & V.11) ✓ V.35 (V.35 & V.28)
 - ✓ V.36 (V.10 & V.11) ✓ RS-485 (unterminated V.11)
- Software Selectable Protocol
- Highest Differential Transmission Rates at over 20Mbps
- +5V Only Operation
- Seven (7) Drivers and Seven (7) Receivers
- Driver and Receiver Tri-state Control
- Internal Transceiver Termination Resistors for V.11 and V.35 Protocols
- Loopback Self-Test Mode
- Improved ESD Tolerance for Analog I/Os
- Compliant to NET1/2 and TBR2 Physical Layer Requirements
- Used in WAN Serial Ports in Routers, Switches, DSU/CSU's and other Access Devices



DESCRIPTION

The SP506 is a monolithic IC that supports eight (8) popular serial interface standards for DTE to DCE connectivity. The SP506 is pin-to-pin compatible to our SP505 multi-protocol transceiver but with faster throughput. The seven (7) drivers and seven (7) receivers can transmit and receive signals at 20Mbps. As with the SP505, the SP506 requires no additional external components for compliant operation for all of the eight (8) modes of operation. All necessary termination is integrated within the SP506 and is switchable when V.35 drivers, V.35 receivers, and V.11 receivers are used. The SP506 can operate as either a DTE or DCE.

Additional features with the SP506 include internal loopback that can be initiated in either single-ended or differential modes. While in loopback mode, driver outputs are internally connected to receiver inputs creating an internal signal path convenient for diagnostic testing. This eliminates the need for an external loopback plug. The SP506 also includes a latch enable pin with the driver and receiver address decoder. Tri-state ability for the driver and receiver outputs is controlled by supplying a 4-bit word into the address decoder. Seven (7) drivers and one (1) receiver in the SP506 include separate enable pins for added convenience.



ABSOLUTE MAXIMUM RATINGS

These are stress ratings only and functional operation of the device at these ratings or any other above those indicated in the operation sections of the specifications below is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

V_{CC}+7V
 Input Voltages:
 Logic.....-0.3V to (V_{CC} +0.5V)
 Drivers.....-0.3V to (V_{CC} +0.5V)
 Receivers..... \pm 15.5V
 Output Voltages:
 Logic.....-0.3V to (V_{CC} +0.5V)
 Drivers..... \pm 15V
 Receivers.....-0.3V to (V_{CC} +0.5V)
 Storage Temperature.....-65°C to +150°C
 Power Dissipation per package
 80-pin QFP (derate 18.3mW°C above +70°C)...1500mW

STORAGE CONSIDERATIONS

Due to the relatively large package size of the 80-pin quad flat-pack, storage in a low humidity environment is preferred. Large high density plastic packages are moisture sensitive and should be stored in Dry Vapor Barrier Bags. Prior to usage, the parts should remain bagged and stored below 40°C and 60%RH. If the parts are removed from the bag, they should be used within 48 hours or stored in an environment at or below 20%RH. If the above conditions cannot be followed, the parts should be baked for four hours at 125°C in order to remove moisture prior to soldering. Exar ships the 80-pin QFP in Dry Vapor Barrier Bags with a humidity indicator card and desiccant pack. The humidity indicator should be below 30%RH.

SPECIFICATIONS

T_A = +25°C and V_{CC} = +4.75V to +5.25V unless otherwise noted.

	MIN.	TYP.	MAX.	UNITS	CONDITIONS
LOGIC INPUTS V_{IL} V_{IH}	2.0		0.8	Volts Volts	
LOGIC OUTPUTS V_{OL} V_{OH}	2.4		0.4	Volts Volts	$I_{OUT} = -3.2mA$ $I_{OUT} = 1.0mA$
V.28 DRIVER <u>DC Parameters</u> Outputs Open Circuit Voltage Loaded Voltage Short-Circuit Current Power-Off Impedance <u>AC Parameters</u> Outputs Transition Time Instantaneous Slew Rate Propagation Delay t_{PHL} t_{PLH} Max.Transmission Rate	\pm 5.0 300		\pm 15 \pm 15 \pm 100	Volts Volts mA Ω μ s V/ μ s μ s μ s kbps	per Figure 1 per Figure 2 per Figure 4 per Figure 5 $V_{CC} = +5V$ for AC parameters per Figure 6; +3V to -3V per Figure 3
V.28 RECEIVER <u>DC Parameters</u> Inputs Input Impedance Open-Circuit Bias HIGH Threshold LOW Threshold <u>AC Parameters</u> Propagation Delay t_{PHL} t_{PLH}	3 0.8	1.7 1.2	7 +2.0 3.0	k Ω Volts Volts Volts ns ns	per Figure 7 per Figure 8 $V_{CC} = +5V$ for AC parameters

SPECIFICATIONS

T_A = +25°C and V_{CC} = +4.75V to +5.25V unless otherwise noted.

	MIN.	TYP.	MAX.	UNITS	CONDITIONS
V.28 RECEIVER (continued)					
<u>AC Parameters (cont.)</u>					
Max.Transmission Rate	120	230		kbps	
V.10 DRIVER					
<u>DC Parameters</u>					
Outputs					
Open Circuit Voltage	±4.0		±6.0	Volts	per Figure 9
Test-Terminated Voltage	0.9V _{CC}			Volts	per Figure 10
Short-Circuit Current			±150	mA	per Figure 11
Power-Off Current			±100	µA	per Figure 12
<u>AC Parameters</u>					
Outputs					
Transition Time			200	ns	per Figure 13; 10% to 90%
Propagation Delay					
t _{PHL}	50	100	500	ns	
t _{PLH}	50	100	500	ns	
Max.Transmission Rate	120			kbps	
V.10 RECEIVER					
<u>DC Parameters</u>					
Inputs					
Input Current	-3.25		+3.25	mA	per Figures 14 and 15
Input Impedance	4			kΩ	
Sensitivity			±0.3	Volts	
<u>AC Parameters</u>					
Propagation Delay					
t _{PHL}	50	120	250	ns	V _{CC} = +5V for AC parameters
t _{PLH}	50	120	250	ns	
Max.Transmission Rate	120			kbps	
V.11 DRIVER					
<u>DC Parameters</u>					
Outputs					
Open Circuit Voltage			±5.0	Volts	per Figure 16
Test Terminated Voltage	±2.0			Volts	per Figure 17
	0.5V _{CC}		0.67V _{CC}	Volts	
Balance			±0.4	Volts	per Figure 17
Offset			+3.0	Volts	per Figure 17
Short-Circuit Current			±150	mA	per Figure 18
Power-Off Current			±100	µA	per Figure 19
<u>AC Parameters</u>					
Outputs					
Transition Time			20	ns	per Figures 21 and 36; 10% to 90%
Propagation Delay					
t _{PHL}	50	65	85	ns	per Figures 33 and 36, C _L = 50pF
t _{PLH}	50	65	85	ns	per Figures 33 and 36, C _L = 50pF
Differential Skew		10	20	ns	per Figures 33 and 36, C _L = 50pF
Max.Transmission Rate	20			Mbps	per Figure 33, C _L = 50pF f _{IN} = 10MHz
V.11 RECEIVER					
<u>DC Parameters</u>					
Inputs					
Common Mode Range	-7		+7	Volts	
Sensitivity			±0.3	Volts	

SPECIFICATIONS

T_A = +25°C and V_{CC} = +4.75V to +5.25V unless otherwise noted.

	MIN.	TYP.	MAX.	UNITS	CONDITIONS
V.11 RECEIVER (continued)					
<u>DC Parameters (cont.)</u>					
Input Current	-3.25		±3.25	mA	per Figure 20 and 22
Current w/100Ω Termination			±60.75	mA	per Figure 23 and 24
Input Impedance	4			kΩ	
<u>AC Parameters</u>					
Propagation Delay					V _{CC} = +5V for AC parameters
t _{PHL}	30	65	85	ns	per Figures 33 and 38; C _L = 50pF
t _{PLH}	30	65	85	ns	per Figures 33 and 38; C _L = 50pF
Differential Skew		10		ns	per Figure 33; C _L = 50pF
Max.Transmission Rate	20			Mbps	per Figure 33; C _L = 50pF f _{IN} = 10MHz
V.35 DRIVER					
<u>DC Parameters</u>					
Outputs					
Open Circuit Voltage			±1.20	Volts	per Figure 16
Test Terminated Voltage	±0.44		±0.66	Volts	per Figure 25
Offset			±0.6	Volts	per Figure 25
Source Impedance	50		150	Ω	per Figure 27; Z _S = V ₂ /V ₁ x 50Ω
Short-Circuit Impedance	135		165	Ω	per Figure 28
<u>AC Parameters</u>					
Outputs					
Transition Time		30	40	ns	per Figure 29; 10% to 90%
Propagation Delay					
t _{PHL}	50	70	90	ns	per Figures 33 and 36; C _L = 20pF
t _{PLH}	50	70	90	ns	per Figures 33 and 36; C _L = 20pF
Differential Skew		7	10	ns	per Figures 33 and 36; C _L = 20pF
Max.Transmission Rate	20			Mbps	per Figure 33; C _L = 20pF f _{IN} = 10MHz
V.35 RECEIVER					
<u>DC Parameters</u>					
Inputs					
Sensitivity		±80		mV	
Source Impedance	90		110	Ω	per Figure 30; Z _S = V ₂ /V ₁ x 50Ω
Short-Circuit Impedance	135		165	Ω	per Figure 31
<u>AC Parameters</u>					
Propagation Delay					V _{CC} = +5V for AC parameters
t _{PHL}	30	75	90	ns	per Figures 33 and 38; C _L = 20pF
t _{PLH}	30	75	90	ns	per Figures 33 and 38; C _L = 20pF
Differential Skew		10		ns	per Figure 33; C _L = 20pF
Max.Transmission Rate	20			Mbps	per Figure 33; C _L = 20pF f _{IN} = 10MHz
TRANSCEIVER LEAKAGE CURRENTS					
Driver Output 3-State Current		500		μA	
Rcvr Output 3-State Current		1	10	μA	per Figure 32; Drivers disabled DEC _X = 0000, 0.4V - V _O - 2.4V

OTHER AC CHARACTERISTICS

T_A = +25°C and V_{CC} = +5.0V unless otherwise noted.

PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITIONS
DRIVER DELAY TIME BETWEEN ACTIVE MODE AND TRI-STATE MODE					
RS-232/V.28					
t _{PZL} ; Tri-state to Output LOW		0.70	5.0	μs	C _L = 100pF, Fig. 34 & 40; S ₁ closed
t _{PZH} ; Tri-state to Output HIGH		0.40	2.0	μs	C _L = 100pF, Fig. 34 & 40; S ₂ closed
t _{PLZ} ; Output LOW to Tri-state		0.20	2.0	μs	C _L = 100pF, Fig. 34 & 40; S ₁ closed
t _{PHZ} ; Output HIGH to Tri-state		0.40	2.0	μs	C _L = 100pF, Fig. 34 & 40; S ₂ closed
RS-423/V.10					
t _{PZL} ; Tri-state to Output LOW		0.15	2.0	μs	C _L = 100pF, Fig. 34 & 40; S ₁ closed
t _{PZH} ; Tri-state to Output HIGH		0.20	2.0	μs	C _L = 100pF, Fig. 34 & 40; S ₂ closed
t _{PLZ} ; Output LOW to Tri-state		0.20	2.0	μs	C _L = 100pF, Fig. 34 & 40; S ₁ closed
t _{PHZ} ; Output HIGH to Tri-state		0.15	2.0	μs	C _L = 100pF, Fig. 34 & 40; S ₂ closed
RS-422/V.11					
t _{PZL} ; Tri-state to Output LOW		2.80	10.0	μs	C _L = 100pF, Fig. 34 & 37; S ₁ closed
t _{PZH} ; Tri-state to Output HIGH		0.10	2.0	μs	C _L = 100pF, Fig. 34 & 37; S ₂ closed
t _{PLZ} ; Output LOW to Tri-state		0.10	2.0	μs	C _L = 15pF, Fig. 34 & 37; S ₁ closed
t _{PHZ} ; Output HIGH to Tri-state		0.10	2.0	μs	C _L = 15pF, Fig. 34 & 37; S ₂ closed
V.35					
t _{PZL} ; Tri-state to Output LOW		2.60	10.0	μs	C _L = 100pF, Fig. 34 & 37; S ₁ closed
t _{PZH} ; Tri-state to Output HIGH		0.10	2.0	μs	C _L = 100pF, Fig. 34 & 37; S ₂ closed
t _{PLZ} ; Output LOW to Tri-state		0.10	2.0	μs	C _L = 15pF, Fig. 34 & 37; S ₁ closed
t _{PHZ} ; Output HIGH to Tri-state		0.15	2.0	μs	C _L = 15pF, Fig. 34 & 37; S ₂ closed
RECEIVER DELAY TIME BETWEEN ACTIVE MODE AND TRI-STATE MODE					
RS-232/V.28					
t _{PZL} ; Tri-state to Output LOW		0.12	2.0	μs	C _L = 100pF, Fig. 35 & 38; S ₁ closed
t _{PZH} ; Tri-state to Output HIGH		0.10	2.0	μs	C _L = 100pF, Fig. 35 & 38; S ₂ closed
t _{PLZ} ; Output LOW to Tri-state		0.10	2.0	μs	C _L = 100pF, Fig. 35 & 38; S ₁ closed
t _{PHZ} ; Output HIGH to Tri-state		0.10	2.0	μs	C _L = 100pF, Fig. 35 & 38; S ₂ closed
RS-423/V.10					
t _{PZL} ; Tri-state to Output LOW		0.10	2.0	μs	C _L = 100pF, Fig. 35 & 38; S ₁ closed
t _{PZH} ; Tri-state to Output HIGH		0.10	2.0	μs	C _L = 100pF, Fig. 35 & 38; S ₂ closed
t _{PLZ} ; Output LOW to Tri-state		0.10	2.0	μs	C _L = 100pF, Fig. 35 & 38; S ₁ closed
t _{PHZ} ; Output HIGH to Tri-state		0.10	2.0	μs	C _L = 100pF, Fig. 35 & 38; S ₂ closed

OTHER AC CHARACTERISTICS (Continued)

T_A = +25°C and V_{CC} = +5.0V unless otherwise noted.

PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITIONS
RS-422/V.11					
t _{PZL} ; Tri-state to Output LOW		0.10	2.0	μs	C _L = 100pF, Fig. 35 & 39; S ₁ closed
t _{PZH} ; Tri-state to Output HIGH		0.10	2.0	μs	C _L = 100pF, Fig. 35 & 39; S ₂ closed
t _{PLZ} ; Output LOW to Tri-state		0.10	2.0	μs	C _L = 15pF, Fig. 35 & 39; S ₁ closed
t _{PHZ} ; Output HIGH to Tri-state		0.10	2.0	μs	C _L = 15pF, Fig. 35 & 39; S ₂ closed
V.35					
t _{PZL} ; Tri-state to Output LOW		0.10	2.0	μs	C _L = 100pF, Fig. 35 & 39; S ₁ closed
t _{PZH} ; Tri-state to Output HIGH		0.10	2.0	μs	C _L = 100pF, Fig. 35 & 39; S ₂ closed
t _{PLZ} ; Output LOW to Tri-state		0.10	2.0	μs	C _L = 15pF, Fig. 35 & 39; S ₁ closed
t _{PHZ} ; Output HIGH to Tri-state		0.10	2.0	μs	C _L = 15pF, Fig. 35 & 39; S ₂ closed
TRANSCEIVER TO TRANSCEIVER SKEW (per Figures 33, 36, 38)					
V.28 Driver		100		ns	[(t _{phl}) _{Tx1} - (t _{phl}) _{Tx6,7}]
		100		ns	[(t _{plh}) _{Tx1} - (t _{plh}) _{Tx6,7}]
V.28 Receiver		20		ns	[(t _{phl}) _{Rx1} - (t _{phl}) _{Rx2,7}]
		20		ns	[(t _{plh}) _{Rx1} - (t _{plh}) _{Rx2,7}]
V.11 Driver		2		ns	[(t _{phl}) _{Tx1} - (t _{phl}) _{Tx6,7}]
		2		ns	[(t _{plh}) _{Tx1} - (t _{plh}) _{Tx6,7}]
V.11 Receiver		3		ns	[(t _{phl}) _{Rx1} - (t _{phl}) _{Rx2,7}]
		3		ns	[(t _{plh}) _{Rx1} - (t _{plh}) _{Rx2,7}]
V.10 Driver		5		ns	[(t _{phl}) _{Tx2} - (t _{phl}) _{Tx3,4,5}]
		5		ns	[(t _{plh}) _{Tx2} - (t _{plh}) _{Tx3,4,5}]
V.10 Receiver		5		ns	[(t _{phl}) _{Rx2} - (t _{phl}) _{Rx3,4,5}]
		5		ns	[(t _{plh}) _{Rx2} - (t _{plh}) _{Rx3,4,5}]
V.35 Driver		4		ns	[(t _{phl}) _{Tx1} - (t _{phl}) _{Tx6,7}]
		4		ns	[(t _{plh}) _{Tx1} - (t _{plh}) _{Tx6,7}]
V.35 Receiver		6		ns	[(t _{phl}) _{Rx1} - (t _{phl}) _{Rx2,7}]
		6		ns	[(t _{plh}) _{Rx1} - (t _{plh}) _{Rx2,7}]

POWER REQUIREMENTS

PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITIONS
V _{CC}	4.75	5.00	5.25	Volts	
I _{CC} (No Mode Selected)		30		mA	All I _{CC} values are with V _{CC} = +5V f _{IN} = 120kbps; Drivers active & loaded. f _{IN} = 10Mbps; Drivers active & loaded. f _{IN} = 10Mbps; Drivers active & loaded. V.35 @ f _{IN} = 10Mbps, V.28 @ 20kbps; Drivers active & loaded.
(V.28/RS-232)		65		mA	
(V.11/X.21)		175		mA	
(EIA-530 & RS-449)		250		mA	
(V.35)		100		mA	

TEST CIRCUITS

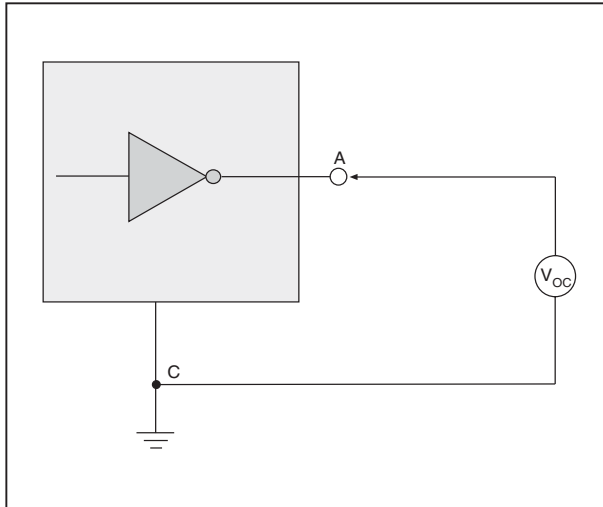


Figure 1. V.28 Driver Output Open Circuit Voltage

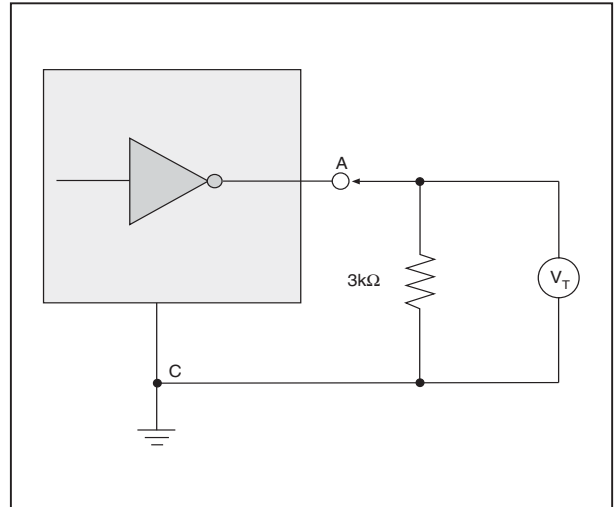


Figure 2. V.28 Driver Output Loaded Voltage

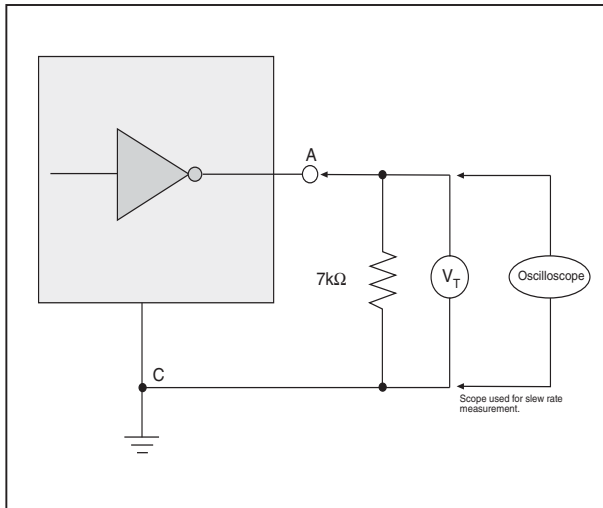


Figure 3. V.28 Driver Output Slew Rate

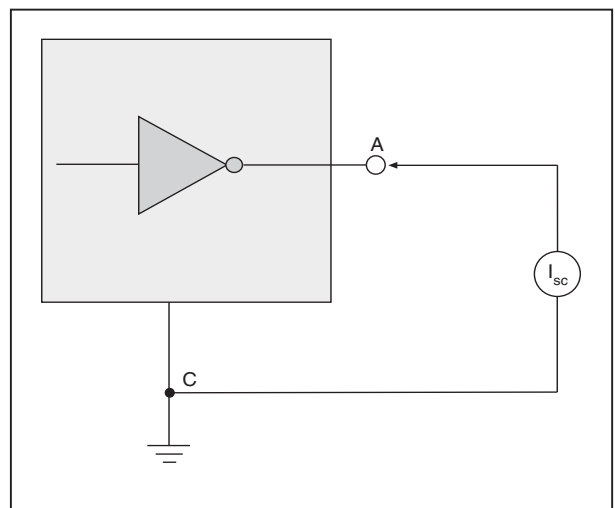


Figure 4. V.28 Driver Output Short-Circuit Current

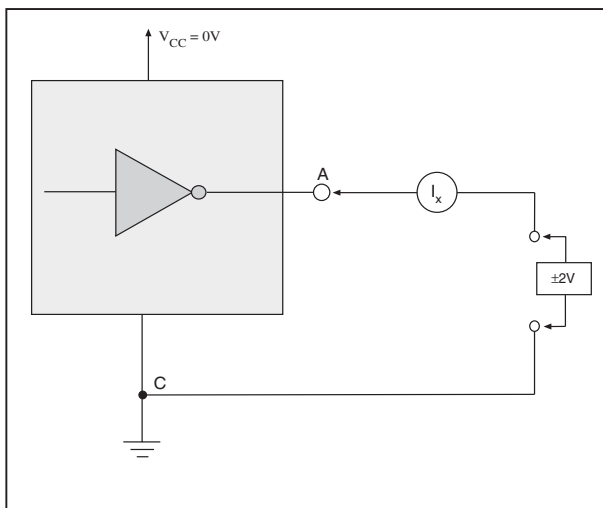


Figure 5. V.28 Driver Output Power-Off Impedance

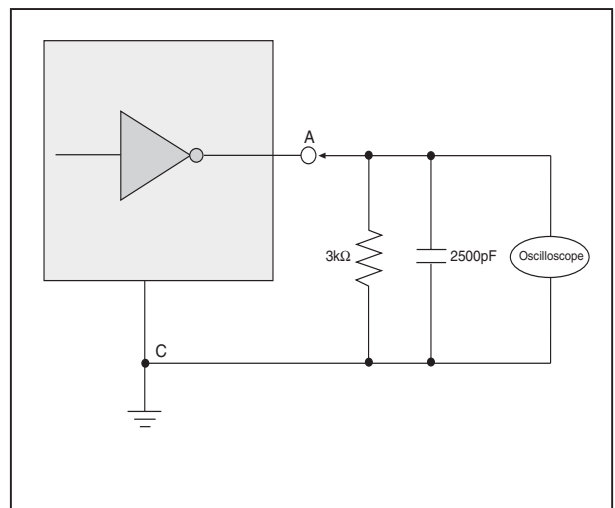


Figure 6. V.28 Driver Output Rise/Fall Times

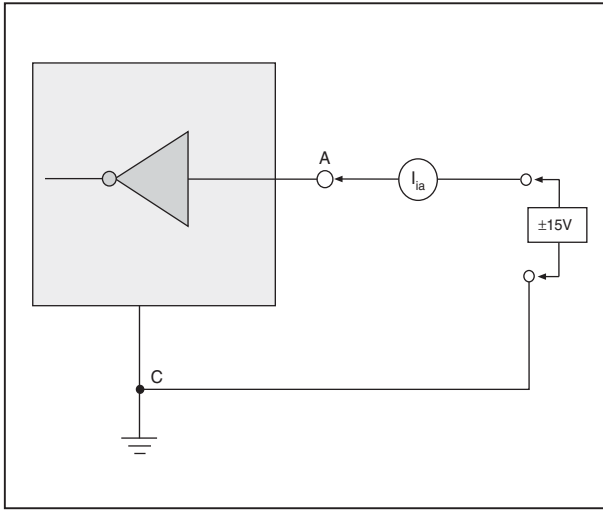


Figure 7. V.28 Receiver Input Impedance

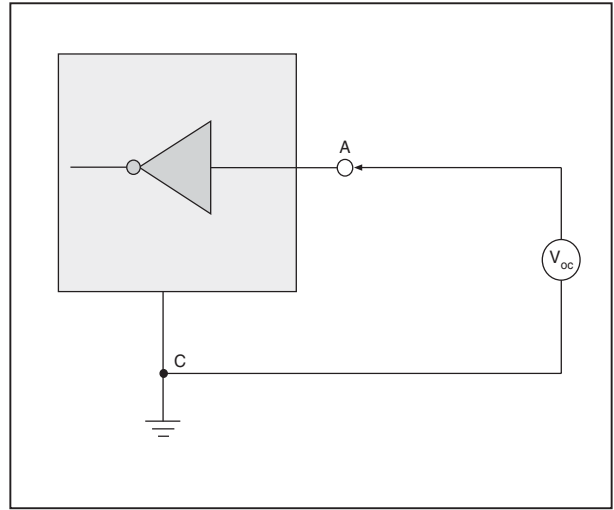


Figure 8. V.28 Receiver Input Open Circuit Bias

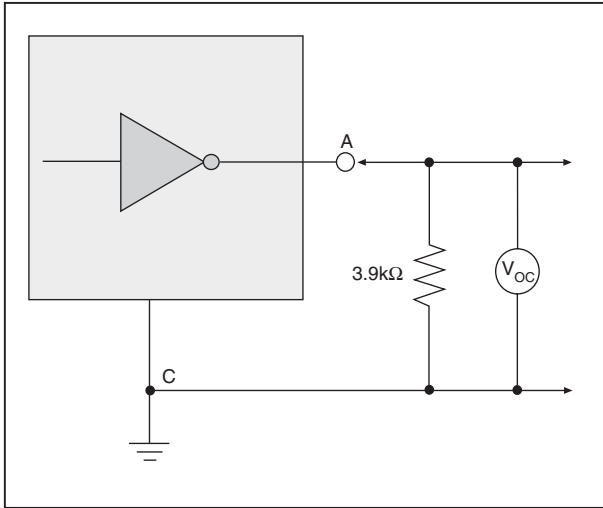


Figure 9. V.10 Driver Output Open-Circuit Voltage

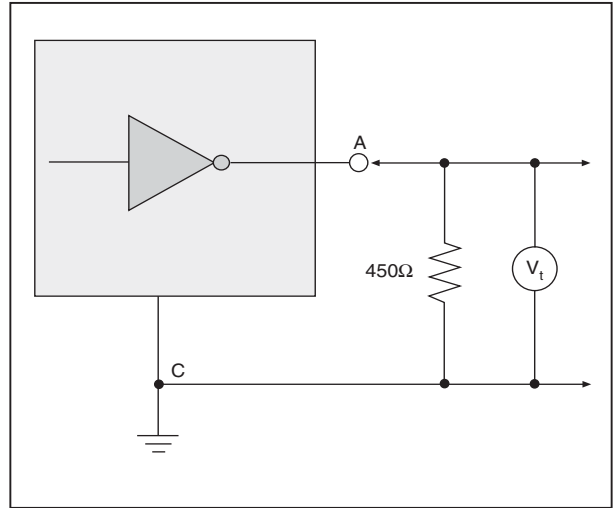


Figure 10. V.10 Driver Output Test Terminated Voltage

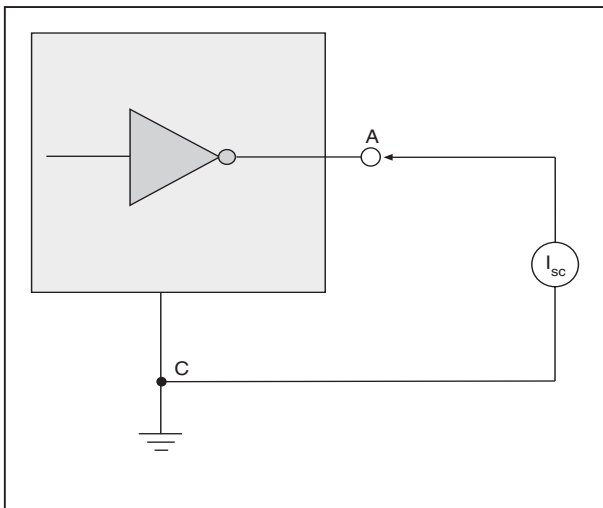


Figure 11. V.10 Driver Output Short-Circuit Current

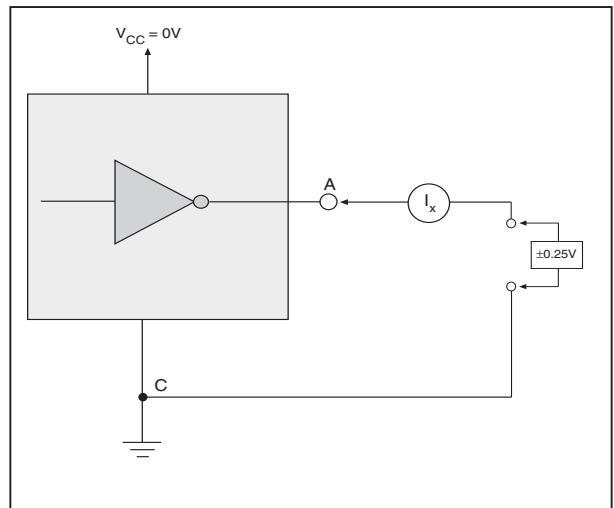


Figure 12. V.10 Driver Output Power-Off Current

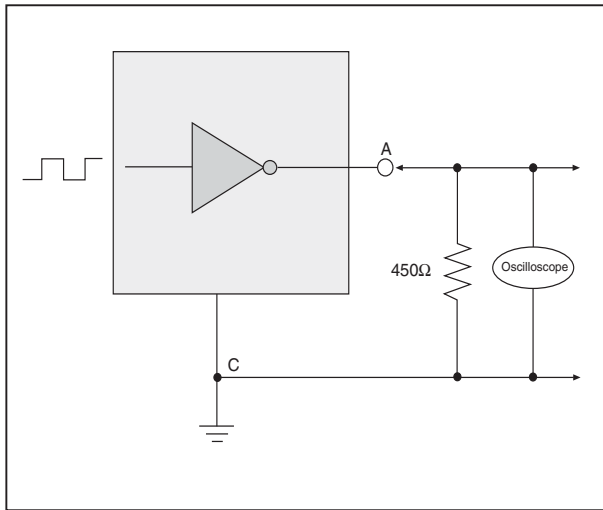


Figure 13. V.10 Driver Output Transition Time

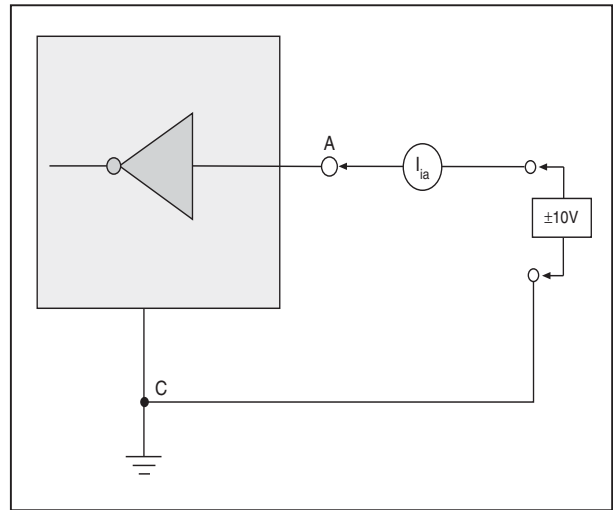


Figure 14. V.10 Receiver Input Current

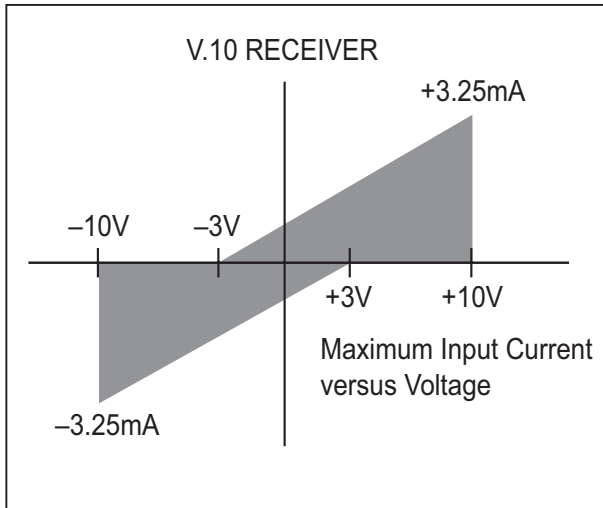


Figure 15. V.10 Receiver Input IV Graph

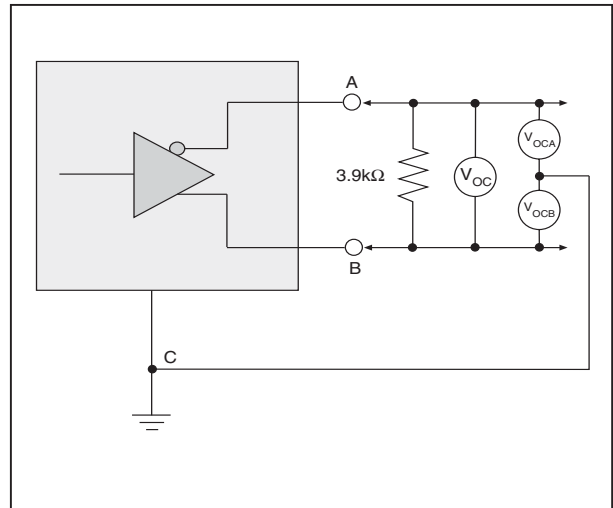


Figure 16. V.11 and V.35 Driver Output Open-Circuit Voltage

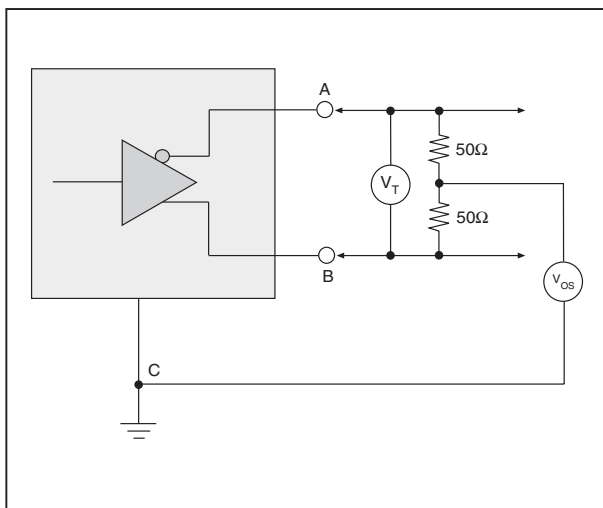


Figure 17. V.11 Driver Output Test Terminated Voltage

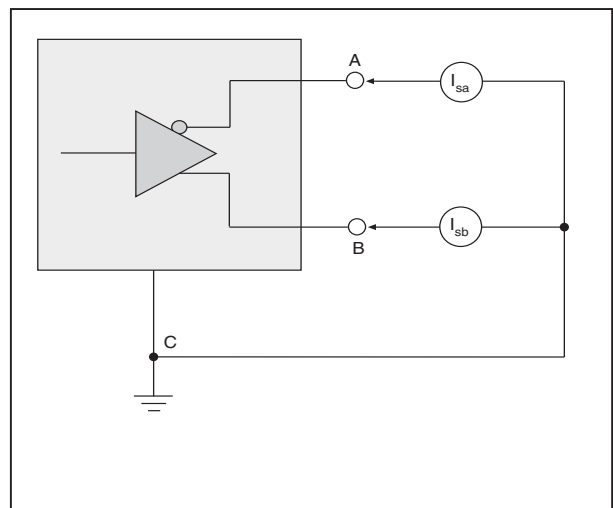


Figure 18. V.11 Driver Output Short-Circuit Current

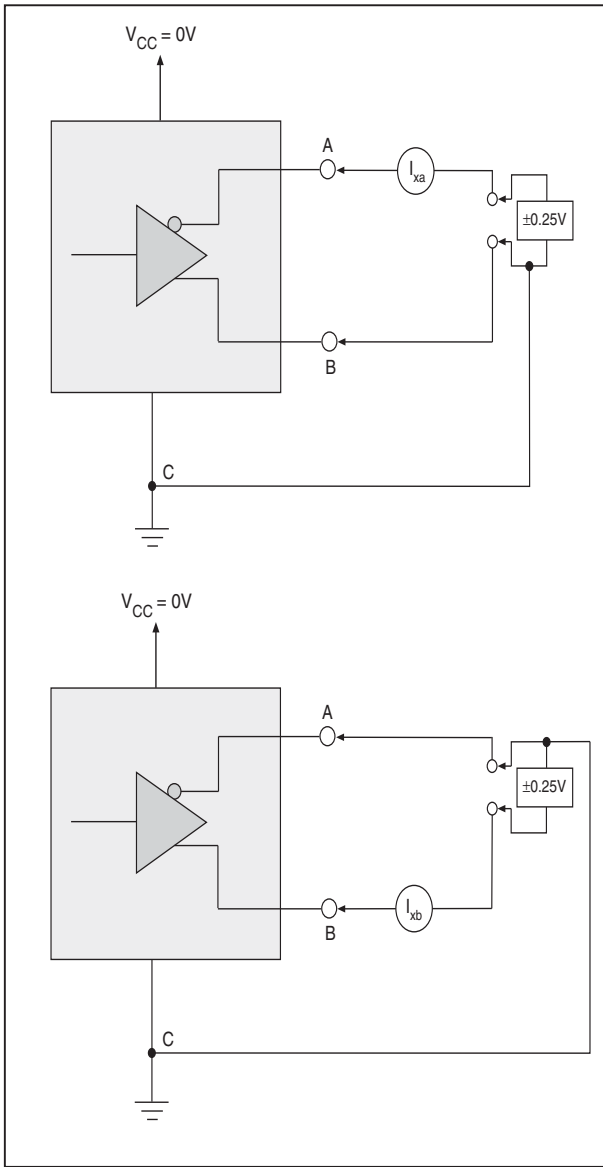


Figure 19. V.11 Driver Output Power-Off Current

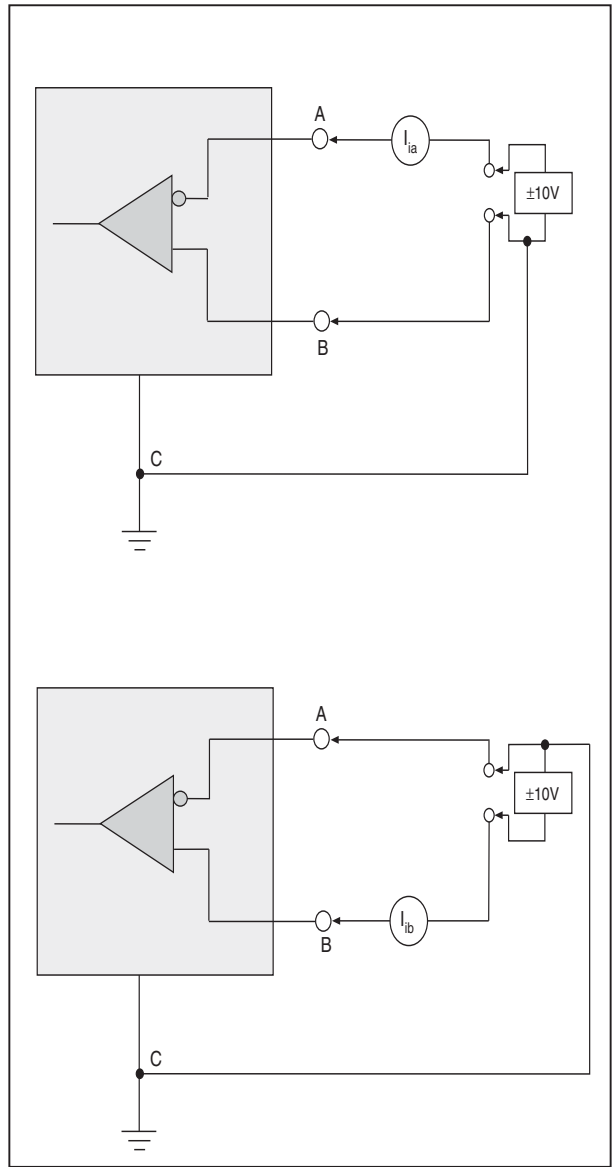


Figure 20. V.11 Receiver Input Current

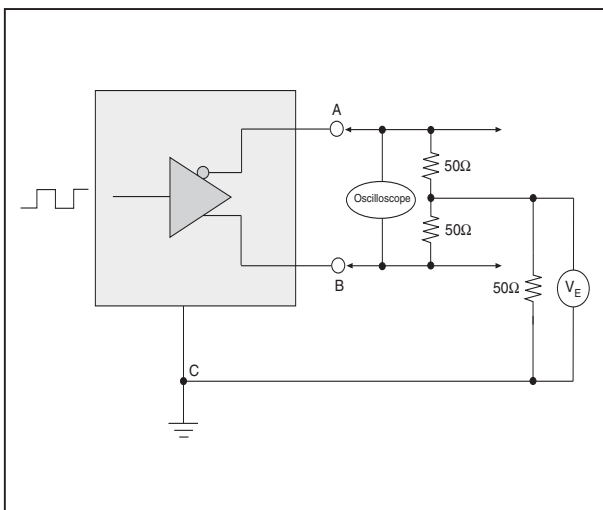


Figure 21. V.11 Driver Output Rise/Fall Time

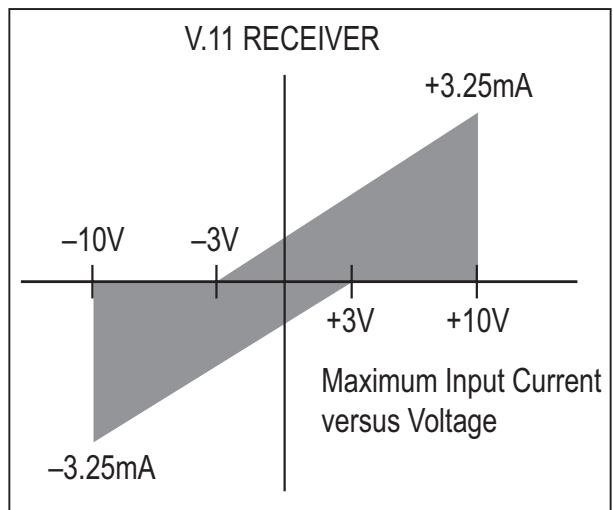


Figure 22. V.11 Receiver Input IV Graph

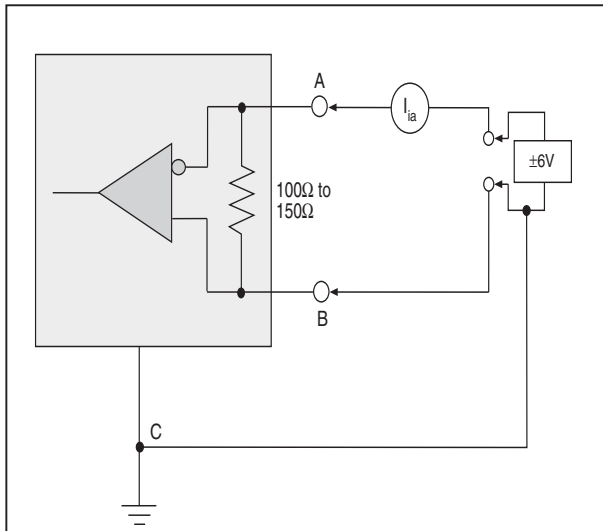


Figure 23. V.11 Receiver Input Current w/ Termination

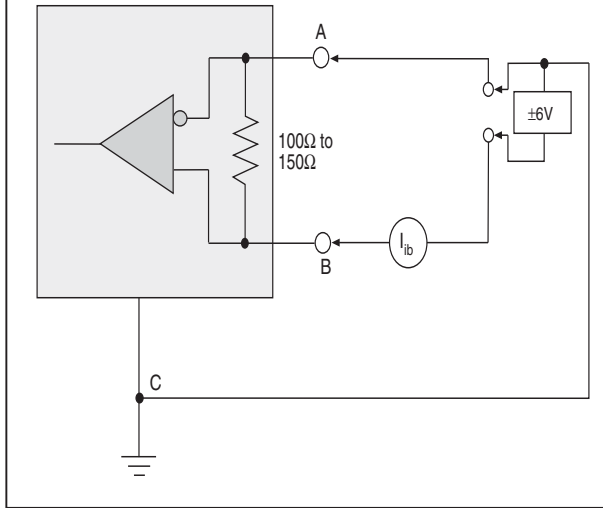


Figure 24. V.11 Receiver Input Graph w/ Termination

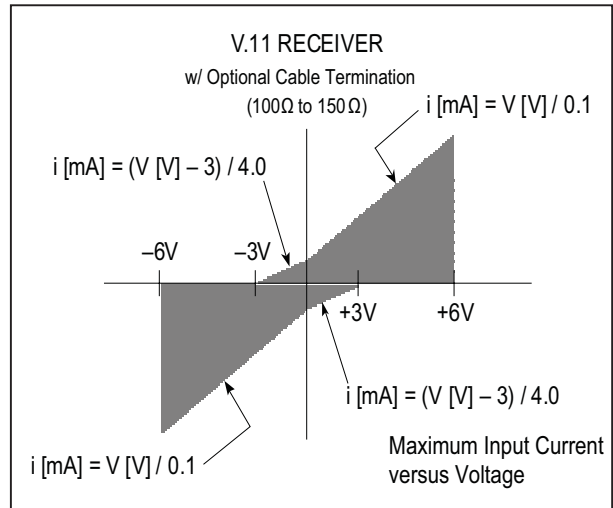


Figure 25. V.35 Driver Output Test Terminated Voltage

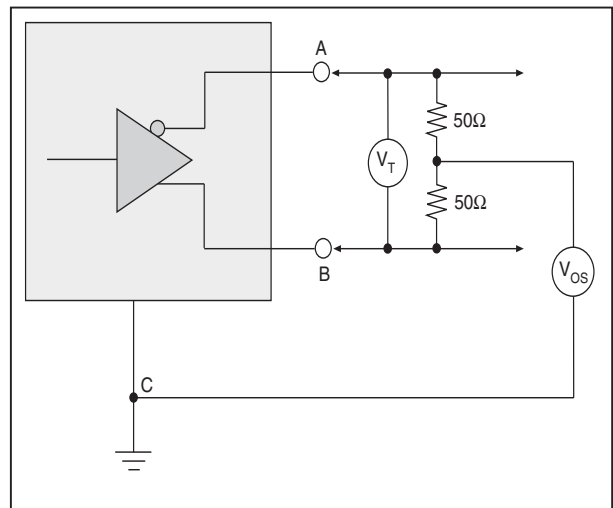


Figure 26. V.35 Driver Output Offset Voltage

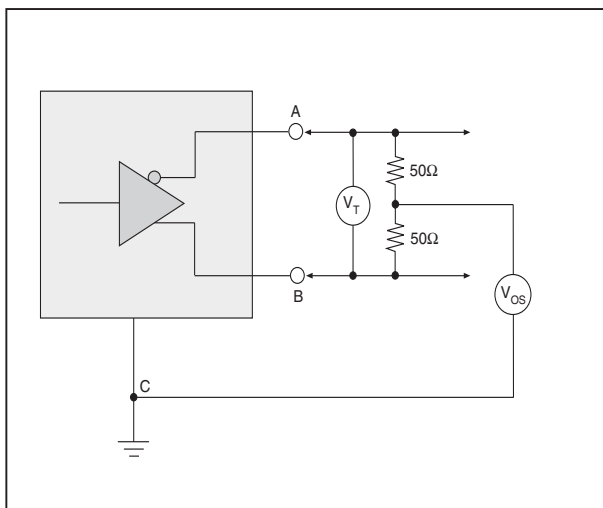


Figure 27. V.35 Driver Output Source Impedance

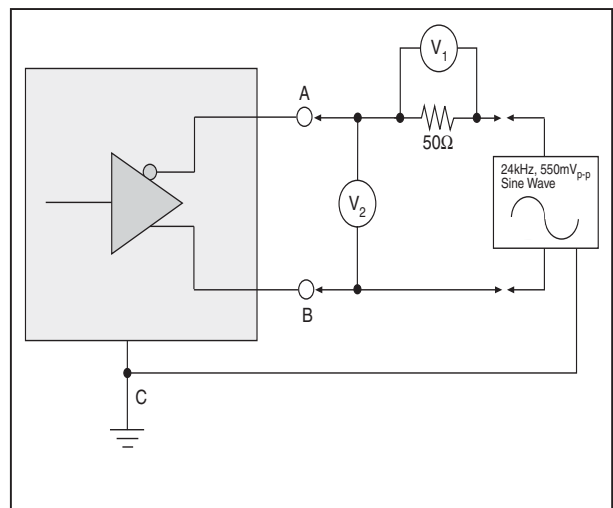


Figure 28. V.35 Driver Output Source Impedance

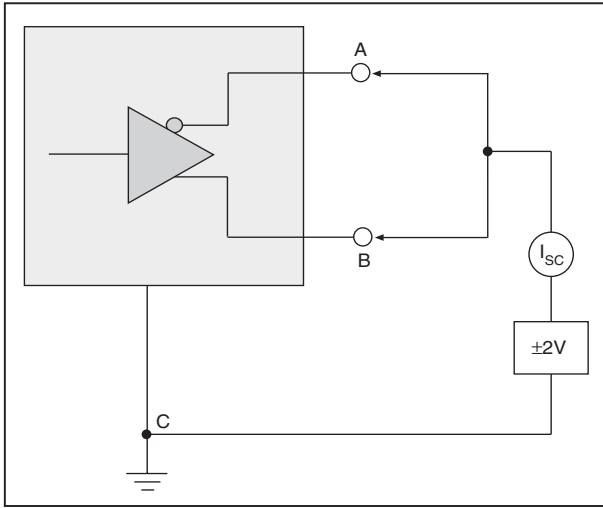


Figure 28. V.35 Driver Output Short-Circuit Impedance

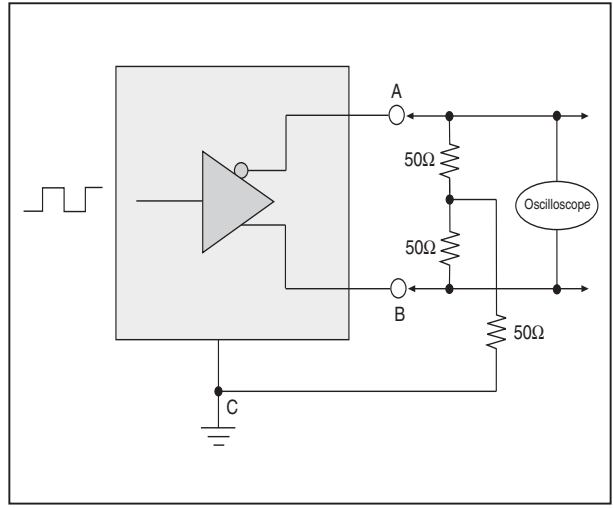


Figure 29. V.35 Driver Output Rise/Fall Time

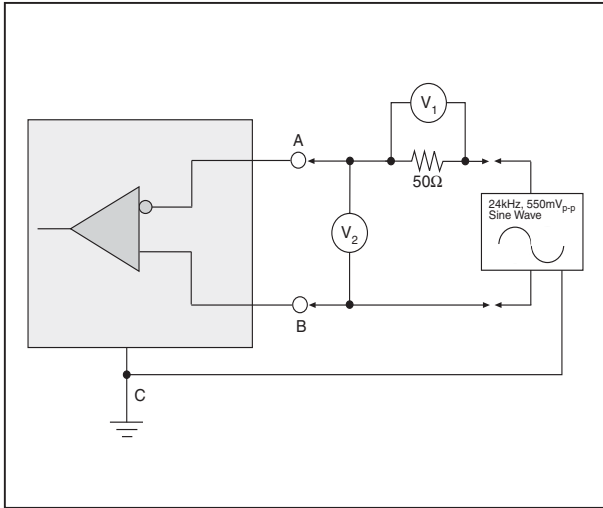


Figure 30. V.35 Receiver Input Source Impedance

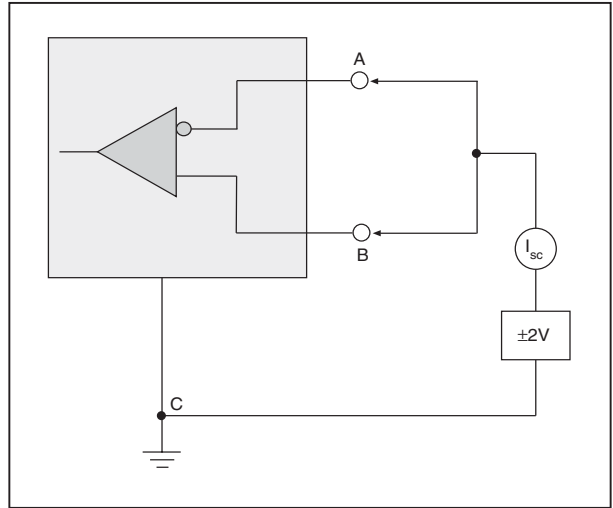


Figure 31. V.35 Receiver Input Short-Circuit Impedance

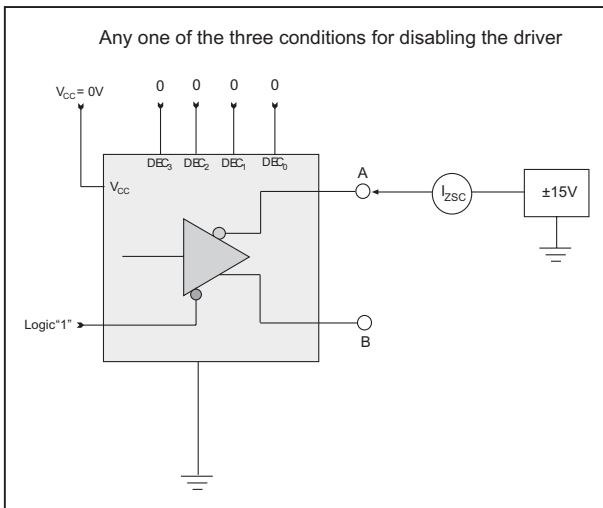


Figure 32. Driver Output Leakage Current Test

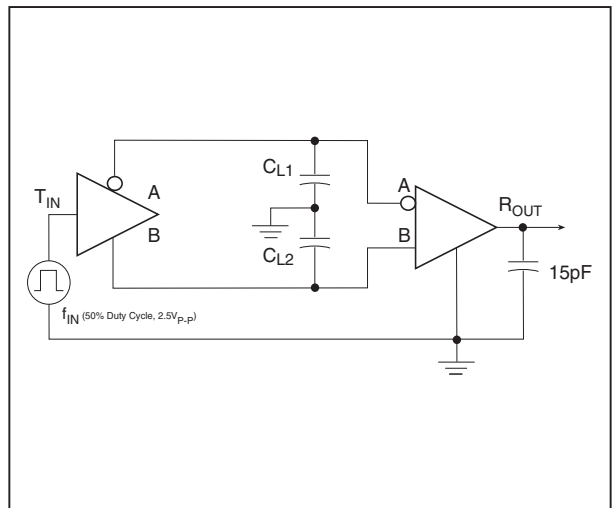


Figure 33. Driver/Receiver Timing Test Circuit

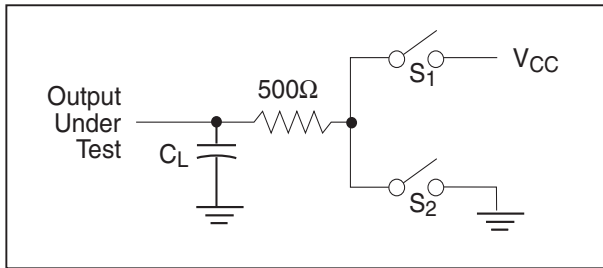


Figure 34. Driver Timing Test Load Circuit

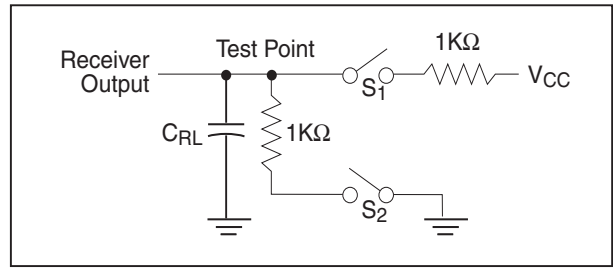


Figure 35. Receiver Timing Test Load Circuit

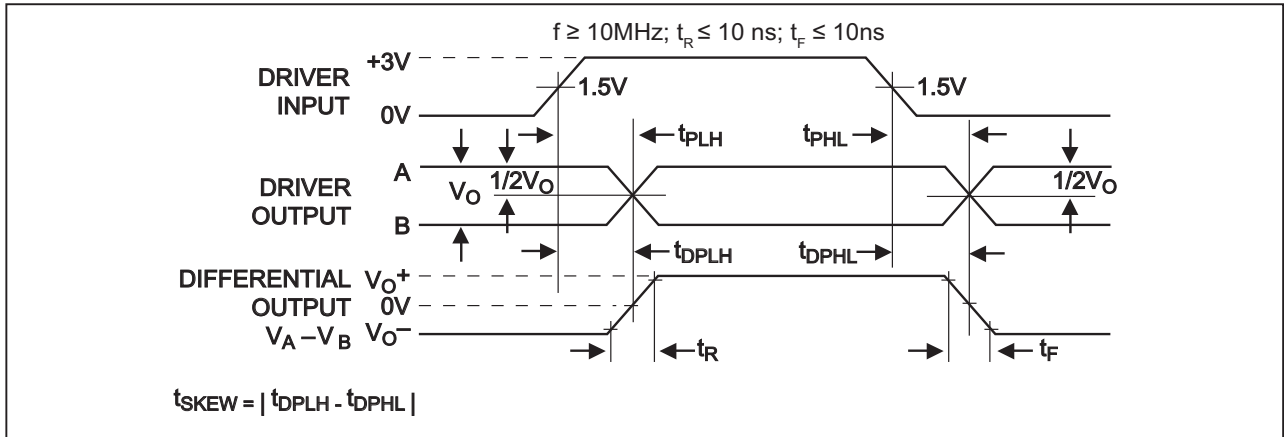


Figure 36. Driver Propagation Delays

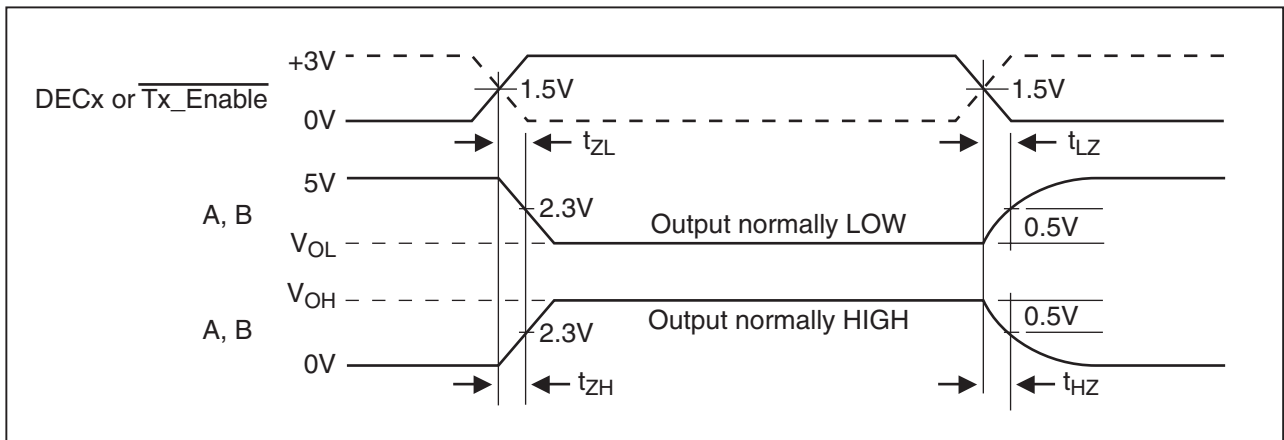


Figure 37. Driver Enable and Disable Times

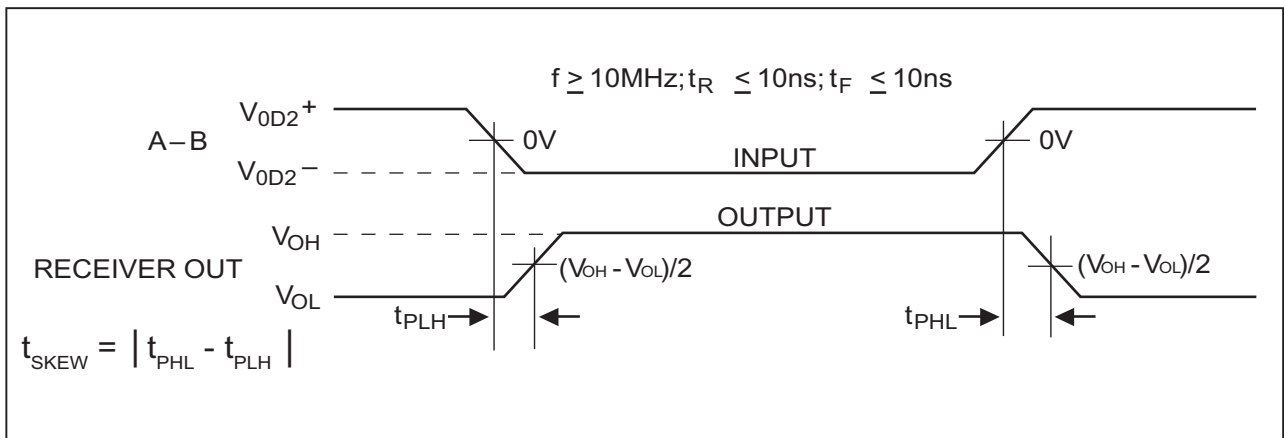


Figure 38. Receiver Propagation Delays

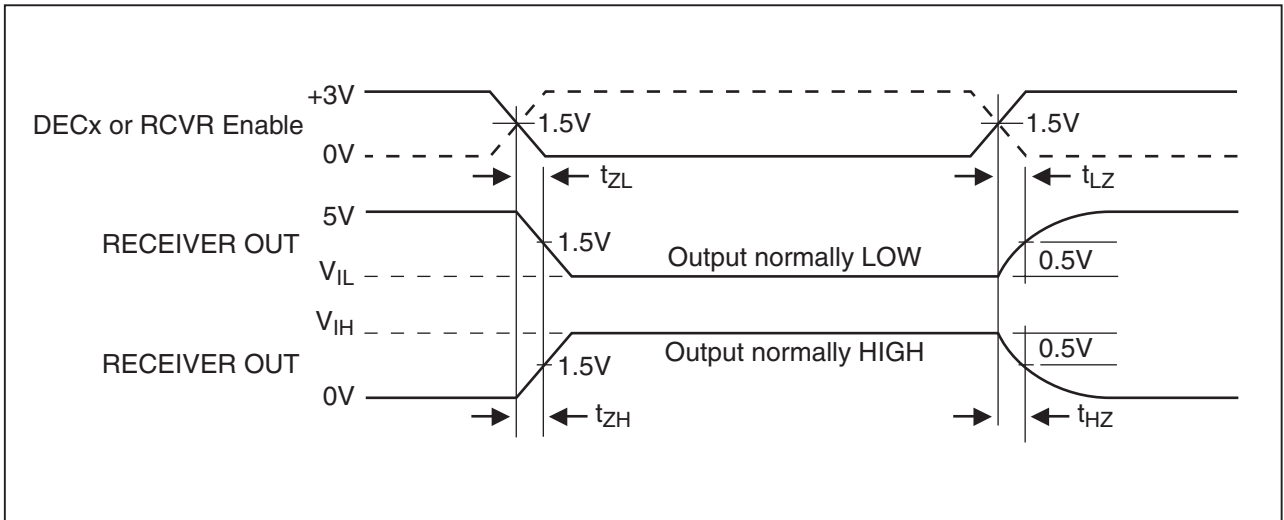


Figure 39. Receiver Enable and Disable Times

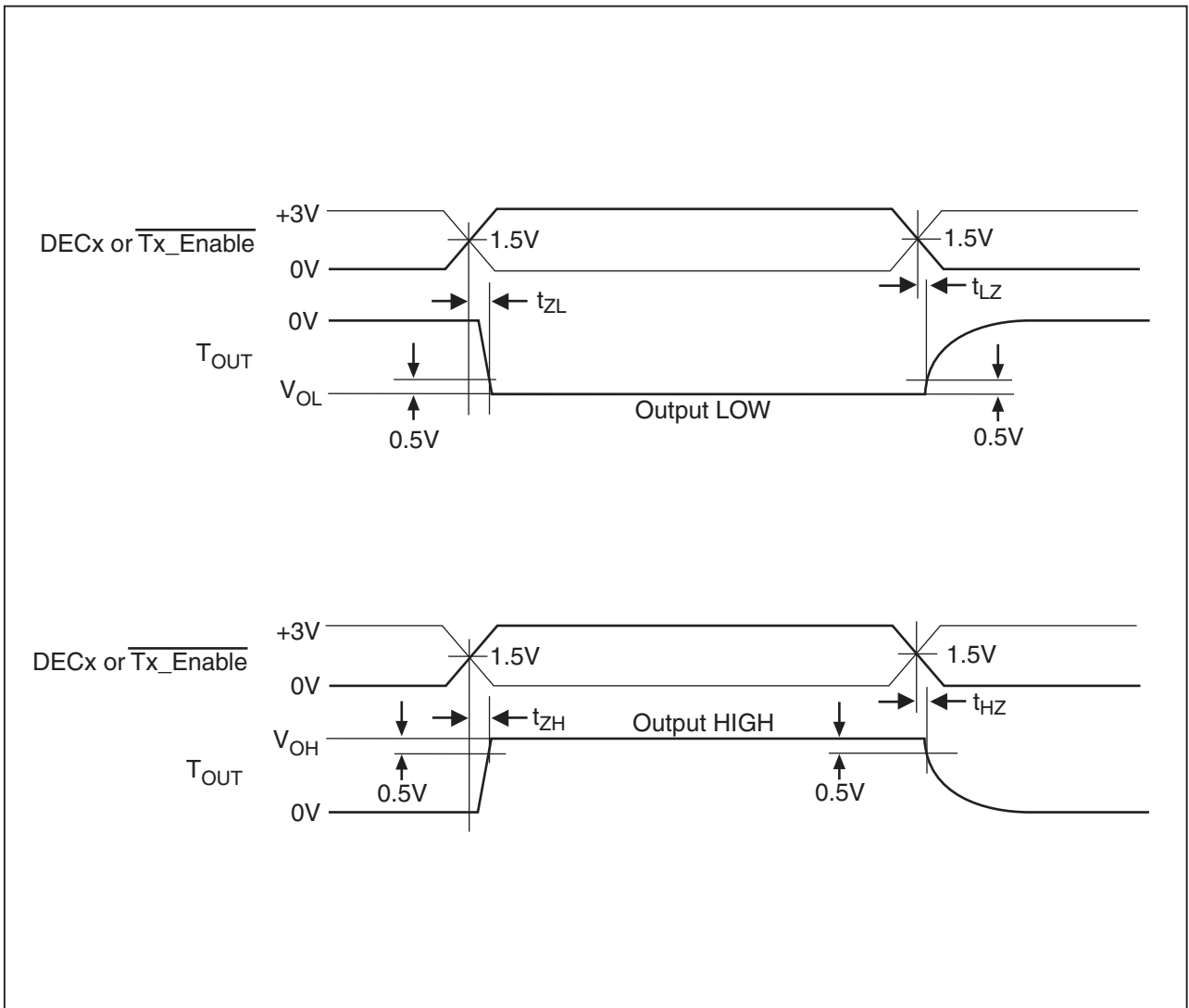


Figure 40. V.28 (RS-232) and V.10 (RS-423) Driver Enable and Disable Times

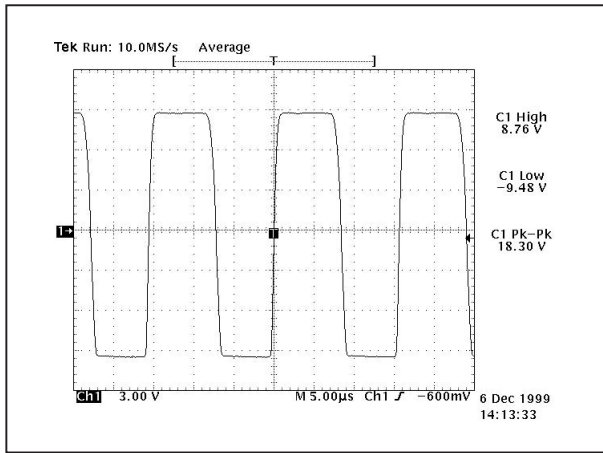


Figure 41. Typical V.28 Driver Output Waveform

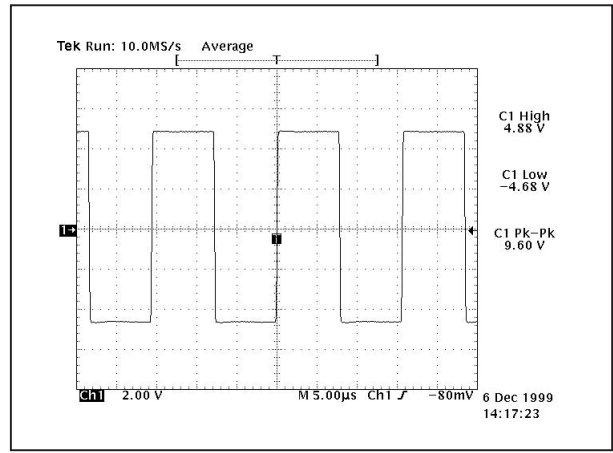


Figure 42. Typical V.10 Driver Output Waveform

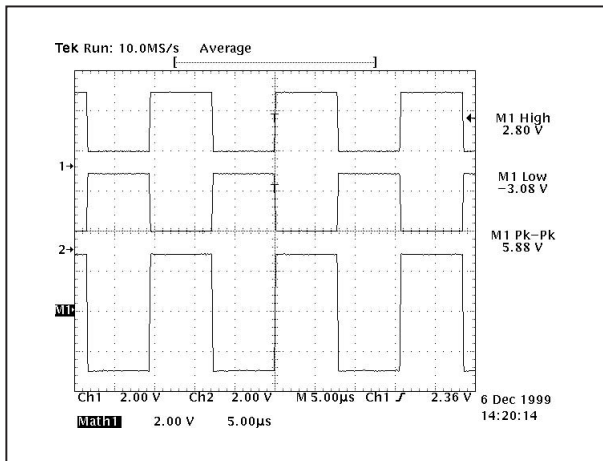


Figure 43. Typical V.11 Driver Output Waveforms

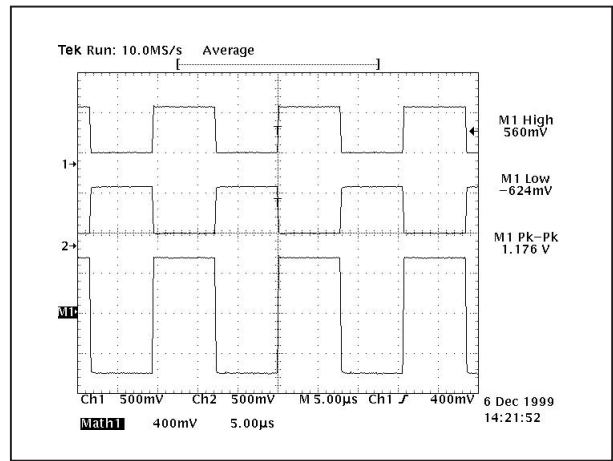
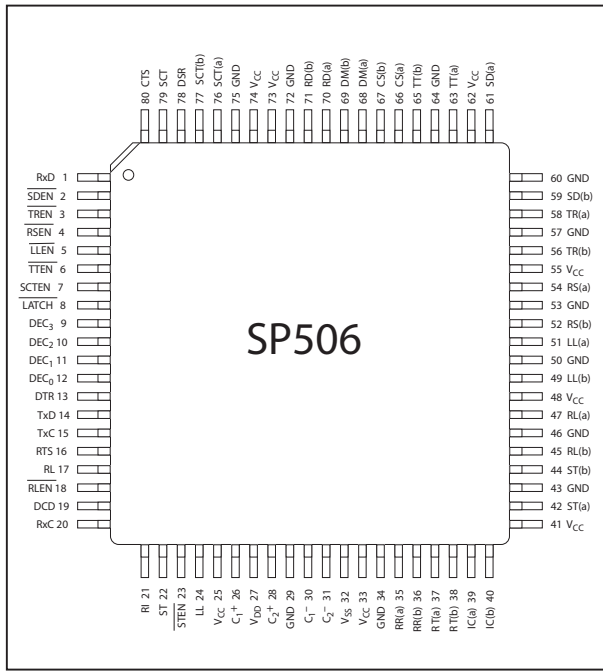


Figure 44. Typical V.35 Driver Output Waveforms

PINOUT



PIN ASSIGNMENTS

CLOCK AND DATA GROUP

Pin 1 — RxD — Receive Data; TTL output, sourced from RD(a) and RD(b) inputs.

Pin 14 — TxD — TTL input ; transmit data source for SD(a) and SD(b) outputs.

Pin 15 — TxC — Transmit Clock; TTL input for TT driver outputs.

Pin 20 — RxC — Receive Clock; TTL output sourced from RT(a) and RT(b) inputs.

Pin 22 — ST — Send Timing; TTL input; source for ST(a) and ST(b) outputs.

Pin 37 — RT(a) — Receive Timing; analog input, inverted; source for RxC.

Pin 38 — RT(b) — Receive Timing; analog input, non-inverted; source for RxC.

Pin 42 — ST(a) — Send Timing; analog output, inverted; sourced from ST.

Pin 44 — ST(b) — Send Timing; analog output, non-inverted; sourced from ST.

Pin 59 — SD(b) — Analog Out — Send data, non-inverted; sourced from TxD.

Pin 61 — SD(a) — Analog Out — Send data, inverted; sourced from TxD.

Pin 63 — TT(a) — Analog Out — Terminal Timing, inverted; sourced from TxC

Pin 65 — TT(b) — Analog Out — Terminal Timing, non-inverted; sourced from TxC.

Pin 70 — RD(a) — Receive Data, analog input; inverted; source for RxD.

Pin 71 — RD(b) — Receive Data; analog input; non-inverted; source for RxD.

Pin 76 — SCT(a) — Serial Clock Transmit; analog input, inverted; source for SCT.

Pin 77 — SCT(b) — Serial Clock Transmit; analog input, non-inverted; source for SCT

Pin 79 — SCT — Serial Clock Transmit; TTL output; sources from SCT(a) and SCT(b) inputs.

CONTROL LINE GROUP

Pin 13 — DTR — Data Terminal Ready; TTL input; source for TR(a) and TR(b) outputs.

Pin 16 — RTS — Ready To Send; TTL input; source for RS(a) and RS(b) outputs.

Pin 17 — RL — Remote Loopback; TTL input; source for RL(a) and RL(b) outputs.

Pin 19 — DCD — Data Carrier Detect; TTL output; sourced from RR(a) and RR(b) inputs.

Pin 21 — RI — Ring In; TTL output; sourced from IC(a) and IC(b) inputs.

Pin 24 — LL — Local Loopback; TTL input; source for LL(a) and LL(b) outputs.

Pin 35 — RR(a) — Receiver Ready; analog input, inverted; source for DCD.

Pin 36 — RR(b) — Receiver Ready; analog input, non-inverted; source for DCD.

Pin 39 — IC(a) — Incoming Call; analog input, inverted; source for RI.

Pin 40 — IC(b) — Incoming Call; analog input, non-inverted; source for RI.

Pin 45 — RL(b) — Remote Loopback; analog output, non-inverted; sourced from RL.

Pin 47 — RL(a) — Remote Loopback; analog output inverted; sourced from RL.

Pin 49 — LL(b) — Local Loopback; analog output, non-inverted; sourced from LL.

Pin 51 — LL(a) — Local Loopback; analog output, inverted; sourced from LL.

Pin 52 — RS(b) — Ready To Send; analog output, non-inverted; sourced from RTS.

Pin 54 — RS(a) — Ready To Send; analog output, inverted; sourced from RTS.

Pin 56 — TR(b) — Terminal Ready; analog output, non-inverted; sourced from DTR.

Pin 58 — TR(a) — Terminal Ready; analog output, inverted; sourced from DTR.

Pin 66 — CS(a) — Clear To Send; analog input, inverted; source for CTS.

Pin 67 — CS(b) — Clear To Send; analog input, non-inverted; source for CTS.

Pin 68 — DM(a) — Data Mode; analog input, inverted; source for DSR.

Pin 69 — DM(b) — Data Mode; analog input, non-inverted; source for DSR.

Pin 78 — DSR — Data Set Ready; TTL output; sourced from DM(a), DM(b) inputs.

Pin 80 — CTS — Clear To Send; TTL output; sourced from CS(a) and CS(b) inputs.

CONTROL REGISTERS

Pins 2 — $\overline{\text{SDEN}}$ — Enables TxD driver, active low; TTL input.

Pins 3 — $\overline{\text{TREN}}$ — Enables DTR driver, active low; TTL input.

Pins 4 — $\overline{\text{RSEN}}$ — Enables RTS driver, active low; TTL input.

Pins 5 — $\overline{\text{LLEN}}$ — Enables LL driver, active low; TTL input.

Pin 6 — $\overline{\text{TTEN}}$ — Enables TT driver, active low; TTL input.

Pin 7 — SCTEN — Enables SCT receiver; active high; TTL input.

Pin 8 — $\overline{\text{LATCH}}$ — Latch control for decoder bits (pins 9-12), active low. Logic high input will make decoder transparent.

Pins 12-9 — $\text{DEC}_0 - \text{DEC}_3$ — Transmitter and receiver decode register; configures transmitter and receiver modes; TTL inputs.

Pin 18 — $\overline{\text{REN}}$ — Enables RL driver; active low; TTL input.

Pin 23 — $\overline{\text{STEN}}$ — Enables ST driver; active low; TTL input.

POWER SUPPLIES

Pins 25, 33, 41, 48, 55, 62, 73, 74 — V_{CC} — +5V input.

Pins 29, 34, 43, 46, 50, 53, 57, 60, 64, 72, 75 — GND — Ground.

Pin 27 — $V_{\text{DD}} + 10\text{V}$ Charge Pump Capacitor — Connects from V_{DD} to V_{CC} . Suggested capacitor size is 22 μF , 16V.

Pin 32 — $V_{\text{SS}} - 10\text{V}$ Charge Pump Capacitor — Connects from ground to V_{SS} . Suggested capacitor size is 22 μF , 16V.

Pins 26 and 30 — C_1^+ and C_1^- — Charge Pump Capacitor — Connects from C_1^+ to C_1^- . Suggested capacitor size is 22 μF , 16V.

Pins 28 and 31 — C_2^+ and C_2^- — Charge Pump Capacitor — Connects from C_2^+ to C_2^- . Suggested capacitor size is 22 μF , 16V.

SP506 Driver Mode Selection

Pin Label	Mode:	RS-232	V.35	RS-422 w/Term.	RS-422	RS-449	EIA-530	EIA-530A	V.36
DEC ₃ -DEC ₀	0000	0010	1110	0100	0101	1100	1101	1111	0110
SD(a)	tri-state	V.28	V.35-	V.11-	V.11-	V.11-	V.11-	V.11-	V.11-
SD(b)	tri-state	tri-state	V.35+	V.11+	V.11+	V.11+	V.11+	V.11+	V.11+
TR(a)	tri-state	V.28	V.28	V.11-	V.11-	V.11-	V.11-	V.10	V.10
TR(b)	tri-state	tri-state	tri-state	V.11+	V.11+	V.11+	V.11+	tri-state	tri-state
RS(a)	tri-state	V.28	V.28	V.11-	V.11-	V.11-	V.11-	V.11-	V.10
RS(b)	tri-state	tri-state	tri-state	V.11+	V.11+	V.11+	V.11+	V.11+	tri-state
RL(a)	tri-state	V.28	V.28	V.11-	V.11-	V.10	V.11-	V.11-	V.10
RL(b)	tri-state	tri-state	tri-state	V.11+	V.11+	tri-state	V.11+	V.11+	tri-state
LL(a)	tri-state	V.28	V.28	V.11-	V.11-	V.10	V.10	V.10	V.10
LL(b)	tri-state	tri-state	tri-state	V.11+	V.11+	tri-state	tri-state	tri-state	tri-state
ST(a)	tri-state	V.28	V.35-	V.11-	V.11-	V.11-	V.11-	V.11-	V.11-
ST(b)	tri-state	tri-state	V.35+	V.11+	V.11+	V.11+	V.11+	V.11+	V.11+
TT(a)	tri-state	V.28	V.35-	V.11-	V.11-	V.11-	V.11-	V.11-	V.11-
TT(b)	tri-state	tri-state	V.35+	V.11+	V.11+	V.11+	V.11+	V.11+	V.11+

Table 1. SP506 Driver Decoder Table

SP506 Receiver Mode Selection































Pin Label	Mode:	RS-232	V.35	RS-422 w/Term.	RS-422	RS-449	EIA-530	EIA-530A	V.36
DEC ₃ -DEC ₀	0000	0010	1110	0100	0101	1100	1101	1111	0110
RD(a)	>10kΩ to GND	V.28	V.35-	V.11- 	V.11-	V.11- 	V.11- 	V.11- 	V.11- 
RD(b)	>10kΩ to GND	>10kΩ to GND	V.35+	V.11+ 	V.11+	V.11+ 	V.11+ 	V.11+ 	V.11+ 
RT(a)	>10kΩ to GND	V.28	V.35-	V.11- 	V.11-	V.11- 	V.11- 	V.11- 	V.11- 
RT(b)	>10kΩ to GND	>10kΩ to GND	V.35+	V.11+ 	V.11+	V.11+ 	V.11+ 	V.11+ 	V.11+ 
CS(a)	>10kΩ to GND	V.28	V.28	V.11-	V.11-	V.11-	V.11-	V.11-	V.10
CS(b)	>10kΩ to GND	>10kΩ to GND	>10kΩ to GND	V.11+	V.11+	V.11+	V.11+	V.11+	>10kΩ to GND
DM(a)	>10kΩ to GND	V.28	V.28	V.11-	V.11-	V.11-	V.11-	V.10	V.10
DM(b)	>10kΩ to GND	>10kΩ to GND	>10kΩ to GND	V.11+	V.11+	V.11+	V.11+	>10kΩ to GND	>10kΩ to GND
RR(a)	>10kΩ to GND	V.28	V.28	V.11-	V.11-	V.11-	V.11-	V.11-	V.10
RR(b)	>10kΩ to GND	>10kΩ to GND	>10kΩ to GND	V.11+	V.11+	V.11+	V.11+	V.11+	>10kΩ to GND
IC(a)	>10kΩ to GND	V.28	V.28	V.11-	V.11-	V.10	V.10	V.10	V.10
IC(b)	>10kΩ to GND	>10kΩ to GND	>10kΩ to GND	V.11+	V.11+	>10kΩ to GND	>10kΩ to GND	>10kΩ to GND	>10kΩ to GND
SCT(a)	>10kΩ to GND	V.28	V.35-	V.11- 	V.11-	V.11- 	V.11- 	V.11- 	V.11- 
SCT(b)	>10kΩ to GND	>10kΩ to GND	V.35+	V.11+ 	V.11+	V.11+ 	V.11+ 	V.11+ 	V.11+ 

Table 2. SP506 Receiver Decoder Table

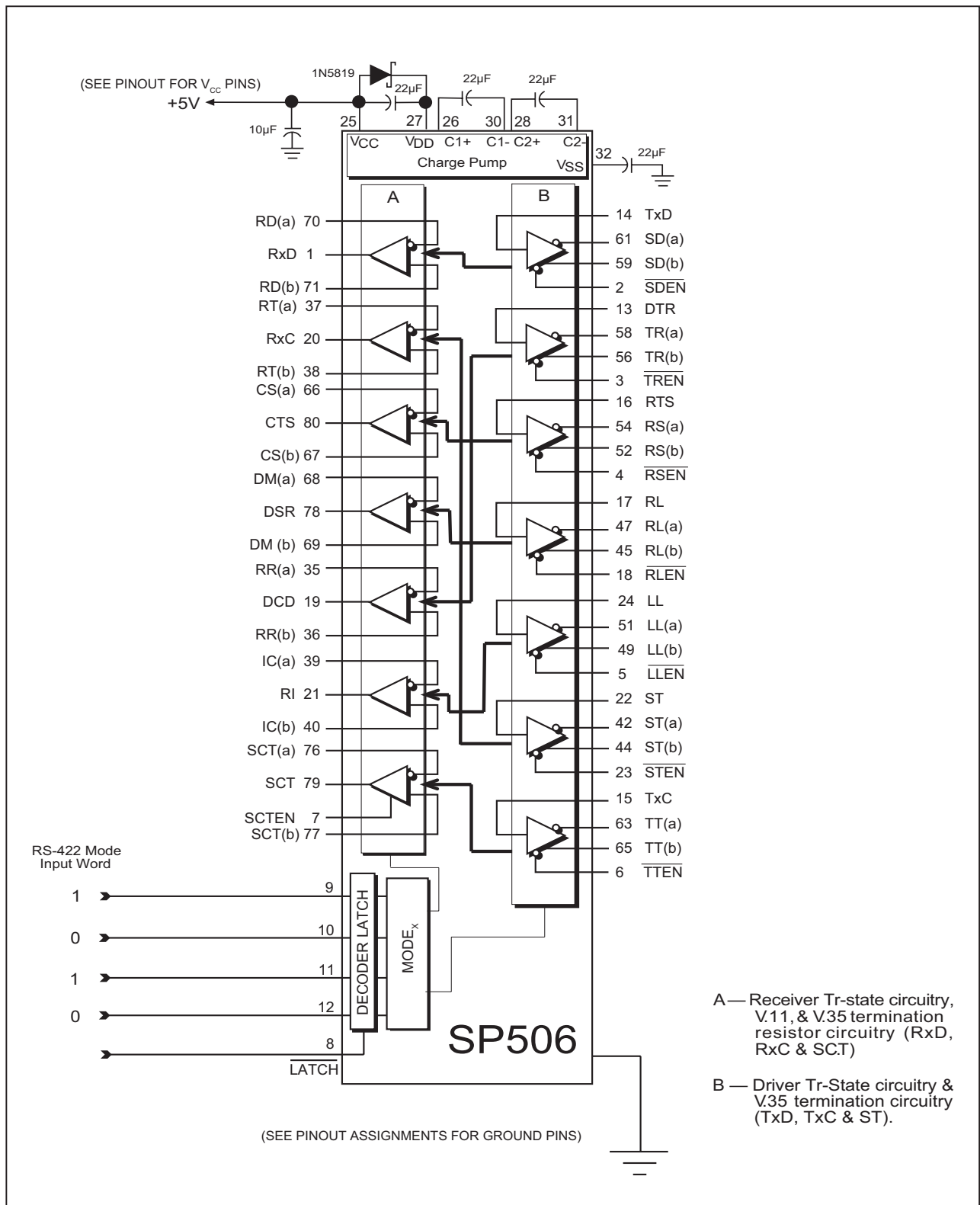
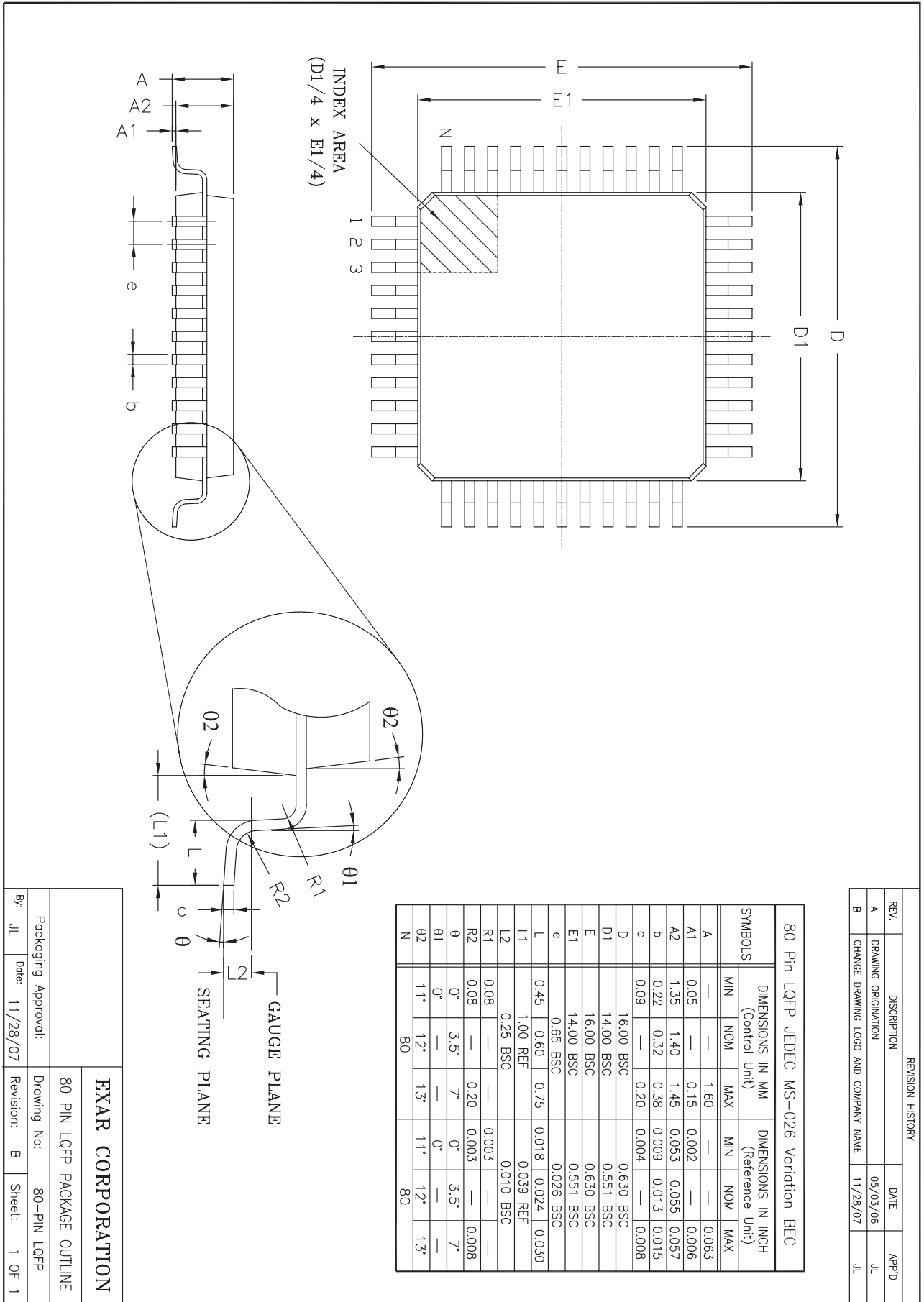


Figure 45. SP506 Typical Operating Circuit



REVISION HISTORY			
REV.	DESCRIPTION	DATE	APP'D.
A	DRAWING ORIGINATION	05/03/06	JL
B	CHANGE DRAWING LOGO AND COMPANY NAME	11/28/07	JL

Packaging Approval:		Drawing No:	
By: JL		Revision: B	
Date: 11/28/07		Sheet: 1 OF 1	
EXAR CORPORATION			
80 PIN LQFP PACKAGE OUTLINE			

ORDERING INFORMATION		
Model	Temperature Range	Package Types
SP506CM-L	0°C to +70°C	80-pin LQFP

Please consult the factory for pricing and availability on a Tape-On-Reel option.

REVISION HISTORY

DATE	REVISION	DESCRIPTION
1/27/04	A	Implemented tracking revision.
8/12/08	1.0.0	SP506 is no longer available in MQFP package per PCN 07-1102-06a. In addition, SP506 is now only available in a Pb-Free, RoHS compliant package. MQFP package drawing has been replaced with the LQFP package drawing. Ordering information has been updated. Changed to Exar datasheet format and revision to 1.0.0.

NOTICE

EXAR Corporation reserves the right to make changes to the products contained in this publication in order to improve design, performance or reliability. EXAR Corporation assumes no responsibility for the use of any circuits described herein, conveys no license under any patent or other right, and makes no representation that the circuits are free of patent infringement. Charts and schedules contained here in are only for illustration purposes and may vary depending upon a user's specific application. While the information in this publication has been carefully checked; no responsibility, however, is assumed for inaccuracies.

EXAR Corporation does not recommend the use of any of its products in life support applications where the failure or malfunction of the product can reasonably be expected to cause failure of the life support system or to significantly affect its safety or effectiveness. Products are not authorized for use in such applications unless EXAR Corporation receives, in writing, assurances to its satisfaction that: (a) the risk of injury or damage has been minimized; (b) the user assumes all such risks; (c) potential liability of EXAR Corporation is adequately protected under the circumstances.

Copyright 2008 EXAR Corporation

Datasheet August 2008

Send your technical inquiry with details to: uarttechsupport@exar.com

Reproduction, in part or whole, without the prior written consent of EXAR Corporation is prohibited.