

BuildingBus 48 Physical Layer

Requirements			4 wires single-ended	number of wires (48V_pwr+, 48V_pwr-, data, earth_gnd signaling (1-wire data w.r.t. 48V_pwr-))		
			3 V	maximum common mode voltage between devices (+/-)		
			1 V	maximum coupling of signal from adjacent wires (e.g. +/-)		
			32	maximum # of devices on cable		
			9000 pF	maximum capacitance between data wire and Pwr- wire		
Master Controller	MasterCtrlr Voltage	Volts	16			
	MasterCtrlr R_Series	ohms	330			
Transmitter	Tmit R_Series	ohms	33			
Receiver	Power Supply	Volts	3.30			
	Max Rcvr Vin	Volts	3.20			
	Additional Voltage	Volts	1.50			
	Max Cable Voltage	Volts	17.00			
Receiver Voltage Divider	Rcvr vDivider	ratio	0.19			
	Rcvr R1_divider	ohms	100,000			
	Rcvr R2_divider	ohms	23,188	check:	3.20	
	vDivider Pwr	mW	2.08			
Receiver Filter	target timeconstant	uSec	0.50			
	cutoff-frequency	MHz	0.32			
	R/C filter capacitor	pF	5.00			
Logic 0 Power	Logic 0 Current	mA	44			
	Logic 0 Power	mW	705			
	% time signaling 0	%	1%			
	Avg Pwr over time	mW	7			
Cable Voltages		Cable	Rcvr vDivider			

	(Volts)	(Volts)
Cable, Logic 1	15.5	2.92
Cable, Logic 0	2.31	0.43
Logic_0 + Vcm_Max + Vcouple_Max	6.31	1.19

Rcvr Analog Comparator

Hysteresis	Volts	2.00	difference between rcvr hysteresis threshold_lo and th
Rcvr Threshold Low	6.31	1.19	Hysteresis References: https://www.ti.com/ http://rohms.rohm.c https://www.analog.c
Rcvr Threshold Hi	8.31	1.56	
Rcvr Threshold Middle		1.38	
Threshold Pwr V.	Volts	3.30	
Threshold R1	ohms	100,000	
Threshold R2	ohms	71,502	$v_{out} = V_{in} * R2 / (R1 + R2)$, $v_{out} * (R1 + R2) = V_{in} * R2$
Threshold Rh	ohms	315,455	Reference (page 7 of the following document): https://

Synchronization

- > hard sync: all devices align to recessive-to-dominant edge of the transmitted Start-Of-Frame bit
- > re-sync: each device looks for getting recessive to dominant transition (1 to 0) outside SYNC_SEG
- > any changes in bit value are expected to occur during the SYNC_SEG segment (first 25% of bit, 2.5uSec); otf
- > when you pull down line (e.g. tmit R_series (e.g. 33 ohm) and NPN), you need to move fast since this could
- > If you tmit a 0 and then a 1, then the 1 is sampled at the 75% time (e.g. 7.5uSec). Also, you do NOT want co

- > Reference: Synchronisation & Timing, NXP #AN1798 <https://www.nxp.com/docs/en/>
CANbus Physical Layer, TI #SLLA270 <https://www.ti.com/lit/an/slla27>

Driving Capacitance

total network length	ft	300	worst case: 300 ft of 30pF/ft cable
capacitance-per-ft	pF/ft	30	
total capacitance	pF	9000	
pull-up time constant	uSec	3.0	

Calculate Pull-up Resistance give uSec Timeconstant for risetime

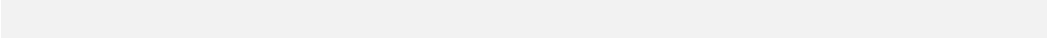
target rise time (uSec TC)	uSec	3.0
Pull-Voltage	Volts	16
current to pull at TC rate	mA	48
power to pull at TC rate	mW	768
pull-up resistance	ohms	333

target TC for rise-time

e.g. Need 330 ohms to drive 9000pF 16V wi

Transmitter Switch

Transistor	Time to reverse diode is too long:	KSP44, PM
	Works ok:	KSC5502, \$
Mosfets	Works, yet rings badly (cannot control rise/fall via R/C at NPN BASE):	BSS225, \$C



id_shield) -- data is single-ended

3V, e.g. 35meters / 4Amps /18awg; or 18meters / 8Amps /18awg)
±1V) after receiver filter (e.g. after 500KHz filter)

re

reshold_hi

it/ug/tidu020a/tidu020a.pdf?ts=1602578956799&ref_url=https%253A%252F%252Fwww.google.com%252F
om/en/products/databook/applinote/ic/amp_linear/comparator/gpl_cmp_hysteresis-e.pdf
:om/en/analog-dialogue/articles/curing-comparator-instability-with-hysteresis.html

R_2 , $v_{out} * R_1 + v_{out} * R_2 - V_{in} * R_2 = 0$, $v_{out} * R_2 - V_{in} * R_2 = -v_{out} * R_1$, $R_2 = -v_{out} * R_1 / (v_{out} - v_{in})$
/www.ti.com/lit/ug/tidu020a/tidu020a.pdf?ts=1602578956799&ref_url=https%253A%252F%252Fwww.google.com%252F

erwise, we re-sync
be used for re-synchronization
mparator flipping 1/0/1 due to ringing otherwise re-sync will occur and goof everything up.

application-note/AN1798.pdf
/0/slla270.pdf?ts=1602684992276&ref_url=https%253A%252F%252Fwww.google.com%252F

th 3uSec TC (timeconstant)

$$I = C \, dv/dt, \quad dt = C \cdot dV/I$$

BTA45, ZTX458, 2nJ6517

5.30, DPAK

0.15, 90mA, 600V, SOT-89