

CW211 Specification

High-Speed USB2.0 (480Mbps) DPDT Switch

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GENERAL DESCRIPTION

CW211 is a low-power, high speed USB2.0 double-pole double-throw (DPDT) analog switch, it can both work high-speed (480Mbps) and full-speed (12Mbps) that operates from 1.8V to 4.8V.

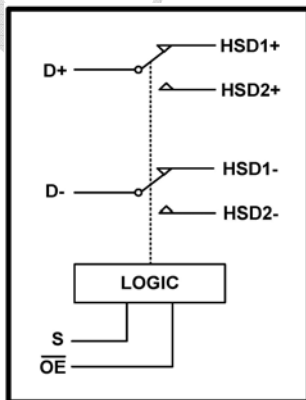
CW211 has wide bandwidth, resulting in signal with minimum edge and phase distortion, and superior channel-to-channel crosstalk minimizes interference.

CW211 contains special circuitry on the D+/D- pins which allows the device to withstand a Vbus short to D+ or D- when the USB devices are either powered off or powered on. CW211 is also designed to minimum current consumption even when the control voltage applied to the S pin.

The above feature is especially fit for portable application such as cell phones, note book, digital camera.

The package of CW211 is UT-QFN-10 (1.4mm*1.8mm) with Pb-free, the operation temperature ranges from -40°C to +85°C.

ANALOG SYMBOL



APPLICATIONS

- Cell phone
- PDA
- Digital Camera
- Notebook
- TV
- Any Portable Instrumentation

FEATURES

- Low On Resistance: 4.5Ω at 3.0V
- Low Bit-to-Bit Skew: 50ps
- Voltage Operation: 1.8V to 4.8V
- Fast Switching Times:
 - Ton 12ns
 - Toff 20ns
- Low Crosstalk: -41dB at 250MHz
- Power off protection when VCC=0V, D+/D- can tolerate up to 5.5V
- High off-isolation: -35dB at 250MHz
- Rail to Rail Input and Output
- Break-Before-Make Switching mode
- Industrial Temperature Range:
 - 40°C ~+85°C
- Lead(Pb) Free UT-QFN10 Package

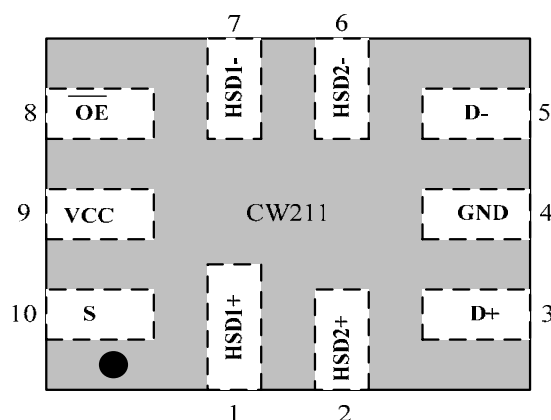
TRUTH TABLE

$\overline{\text{OE}}$	S	HSD1+ HSD1-	HSD2+ HSD2-
0	0	ON	OFF
0	1	OFF	ON
1	*	OFF	OFF

Note:

- *: Logic 0 or Logic 1
- ON: Switch on
- OFF: Switch off

PIN CONFIGURATIONS (top view)



PIN DESCRIPTION

Pin Num.	Pin Name	Function
1,7	HSD1+, HSD1-	Data Port1
2,6	HSD2+, HSD2-	Data Port2
3,5	D+, D-	Data
8	$\overline{\text{OE}}$	Output Enable
10	S	Select input
9,4	VCC, GND	Power

ABSOLUTE MAXIMUM RATINGS

Parameter	Ranges
Supply Voltage VCC (to GND)	0V~5.5V
S, $\overline{\text{OE}}$, HSDn+/HSDn-, D+/D-	-0.3V~VCC+0.5V
Continuous Current HSDn or Dn	±100mA
Peak Current HSDn or Dn	±150mA
Operating Temperature Range	-40°C ~ +85°C
Junction Temperature	150°C
Storage Temperature Range	-60°C ~ +150°C
Lead Temperature(soldering, 10s)	260°C
ESD-HBM	4000v (level: 3A)
ESD-MM	400v (level: 3A)

Caution:

Stresses beyond those listed under “**Absolute Maximum Ratings**” may cause permanent damage to the device.

This integrated circuit can be damaged by ESD if you don't pay attention to ESD Protection. Please also pay attention to ESD Protection in product flow to minimum ESD damage.

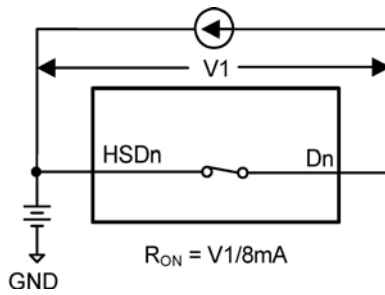
ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNIT
ANALOG SWITCH							
Analog I/O Voltage (HSD1+, HSD1-, HSD2+, HSD2-)	VIS		-40°C to +85°C	0		VCC	V
On-Resistance	RON	VCC = 3.0V, VIS = 0V to 0.4V, ID = 8mA, Circuit 1	+25°C		4.5	8.0	Ω
			-40°C to +85°C			9	
On-Resistance Match Between Channels	ΔRON	VCC = 3.0V, VIS = 0V to 0.4V, ID = 8mA, Circuit 1	+25°C		0.25	0.6	Ω
			-40°C to +85°C			1.0	
On-Resistance Flatness	RFLAT(ON)	VCC = 3.0V, VIS = 0V to 1.0V, ID = 8mA, Circuit 1	+25°C		1.5	2.0	Ω
			-40°C to +85°C			2.6	
Power Off Leakage Current (D+, D-)	I _{OFF}	VCC = 0V, VD = 0V to 3.6 V, VS, VOE = 0V or 3.6 V	-40°C to +85°C			1	μA
Increase in I+ per Control Voltage	ICCT	VCC = 3.6V, VS or VOE = 2.6 V	-40°C to +85°C			5	μA
Source Off Leakage Current	I _{HSD2(OFF)} , I _{HSD1(OFF)}	VCC = 3.6V, VIS = 3.3V/ 0.3V, VD = 0.3V/ 3.3V	-40°C to +85°C			1	μA
Channel On Leakage Current	I _{HSD2(ON)} , I _{HSD1(ON)}	VCC = 3.6V, VIS = 3.3V/ 0.3V, VD = 3.3V/ 0.3V or floating	-40°C to +85°C			1	μA
DIGITAL INPUTS							
Input High Voltage	V _{IH}		-40°C to +85°C	1.6			V

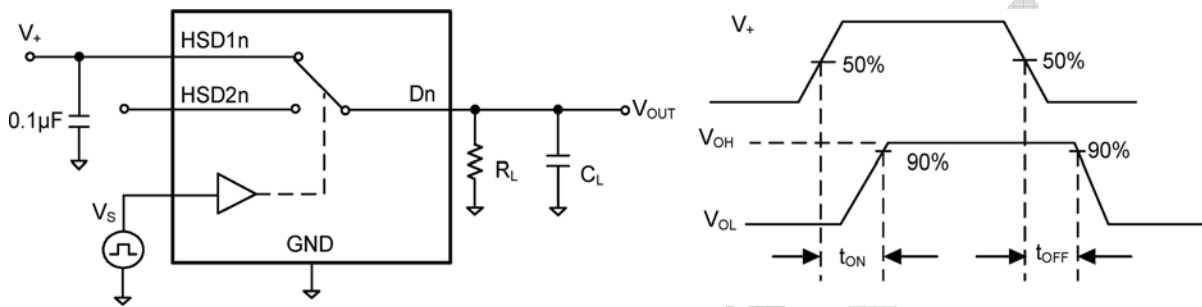
Input Low Voltage	VIL		-40°C to +85°C			0.5	V
Input Leakage Current	IIN	VCC = 3.0V, VS , VOE = 0V or VCC	-40°C to +85°C			1	μA
DYNAMIC CHARACTERISTICS							
Turn-On Time	TON	VIS = 0.8V, RL = 50Ω, CL = 10pF, Circuit 2	+25°C			12	ns
Turn-Off Time	TOFF		+25°C			20	ns
Break-Before-Make Time Delay	TD	VIS = 0.8V, RL = 50Ω, CL = 10pF, Circuit 3	+25°C			4	ns
Propagation Delay	TPD	RL = 50Ω, CL = 10pF	+25°C			0.25	ns
Off Isolation	OISO	Signal = 0dBm, RL = 50Ω, f = 250MHz, Circuit 4	+25°C			-35	dB
Channel-to-Channel Crosstalk	XTALK	Signal = 0dBm, RL = 50Ω, f = 250MHz, Circuit 5	+25°C			-41	dB
-3dB Bandwidth	BW	Signal = 0dBm, RL = 50Ω, CL = 5pF, Circuit 6	+25°C			600	MHz
Channel-to-Channel Skew	TSKEW	RL = 50Ω, CL = 10pF	+25°C			0.05	ns
Charge Injection Select Input to Common I/O	Q	VG = GND, CL = 1.0nF, RG = 0Ω, Q = CL x VOUT, Circuit 7	+25°C			15	pC
HSD+, HSD-, D+, D- ON Capacitance	CON		+25°C			7.5	pF
POWER REQUIREMENTS							
Power Supply Range	VCC		-40°C to +85°C	1.8		4.8	V
Power Supply Current	IVCC	VCC = 3.0V, VS , VOE = 0V or VCC, No data is transmitting	-40°C to +85°C			1	μA

(Specification subject to change without notice.)

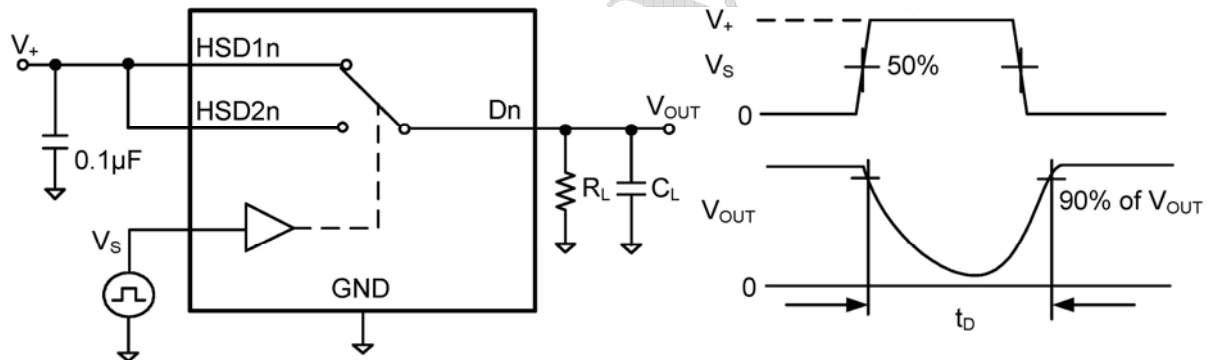
TEST CIRCUITS



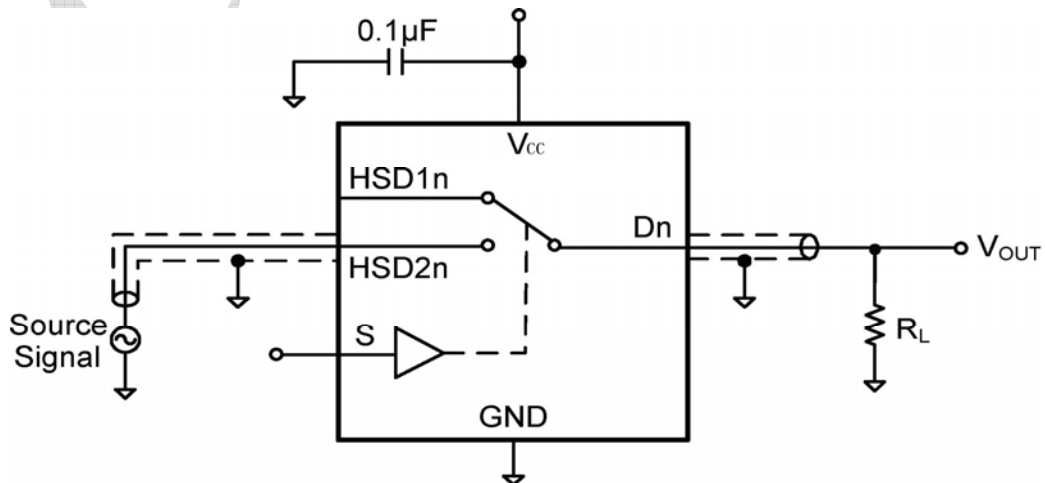
Circuit 1: On Resistance



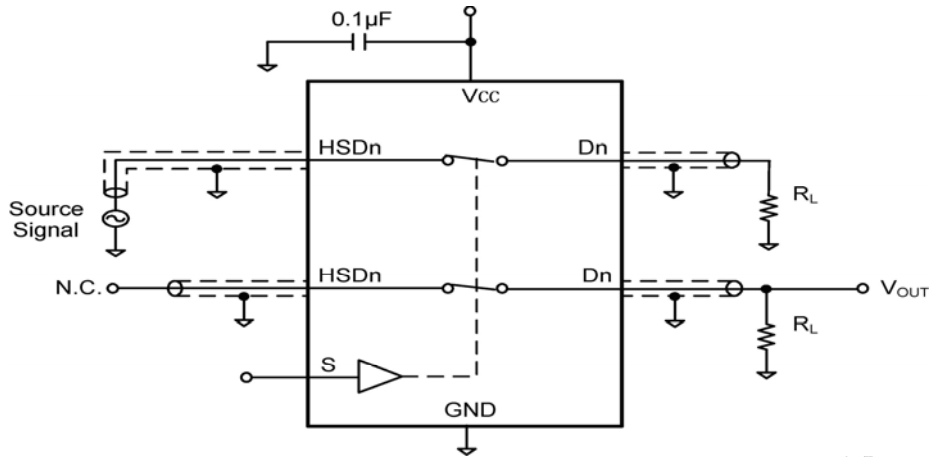
Circuit 2: Switching Times (Ton/Toff)



Circuit 3: Break before Make Time (td)

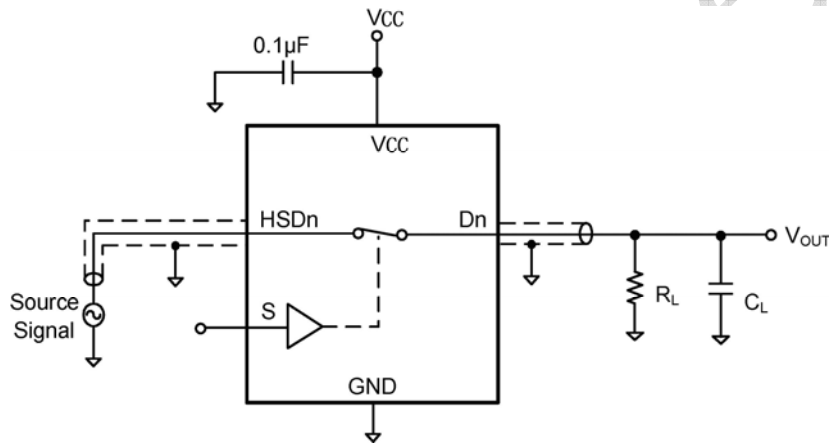


Circuit 4: off isolation

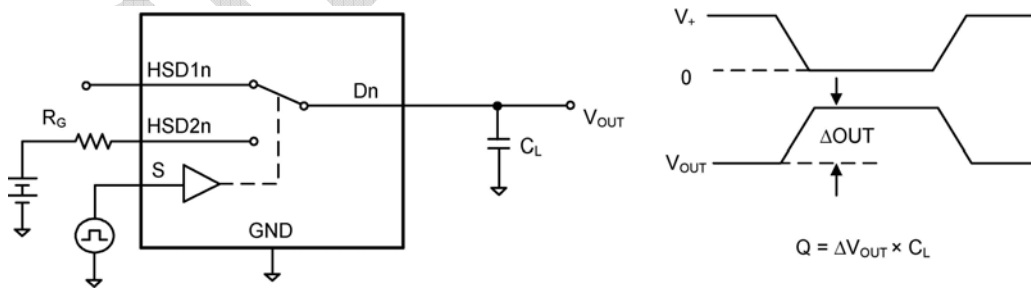


Channel To Channel Crosstalk = $-20 * \text{Log}(V_{\text{HSDn}}/V_{\text{OUT}})$

Circuit 5: Channel-to-Channel Crosstalk



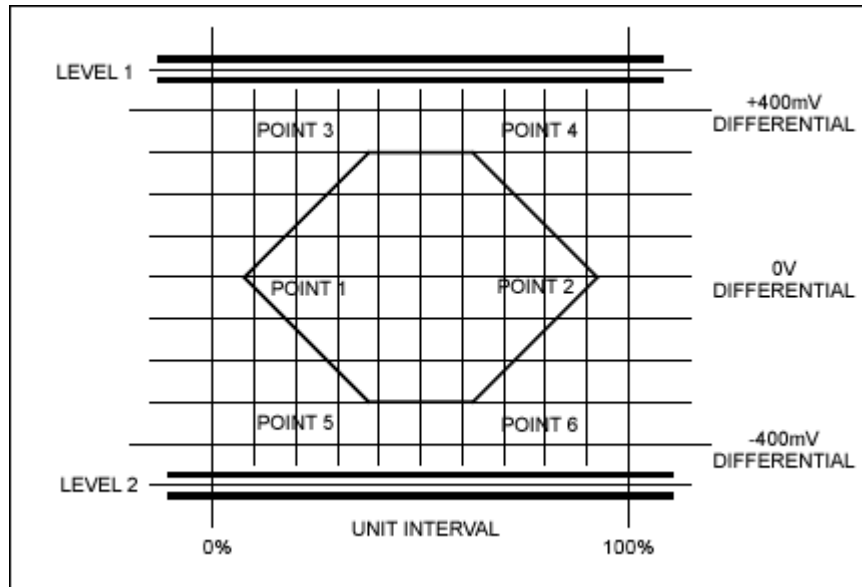
Circuit 6: -3dB bandwidth



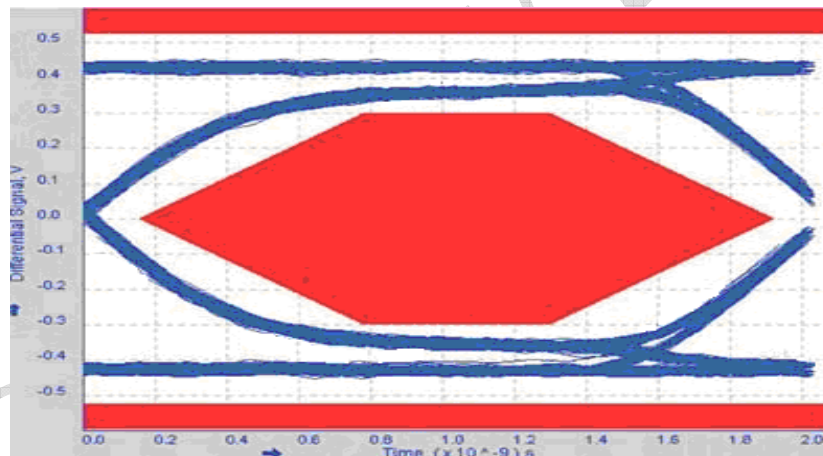
Circuit 7: Charge injection (Q)

EYE DIAGRAM

Eye diagram is below:



Eye diagram template in USB2.0 Specification

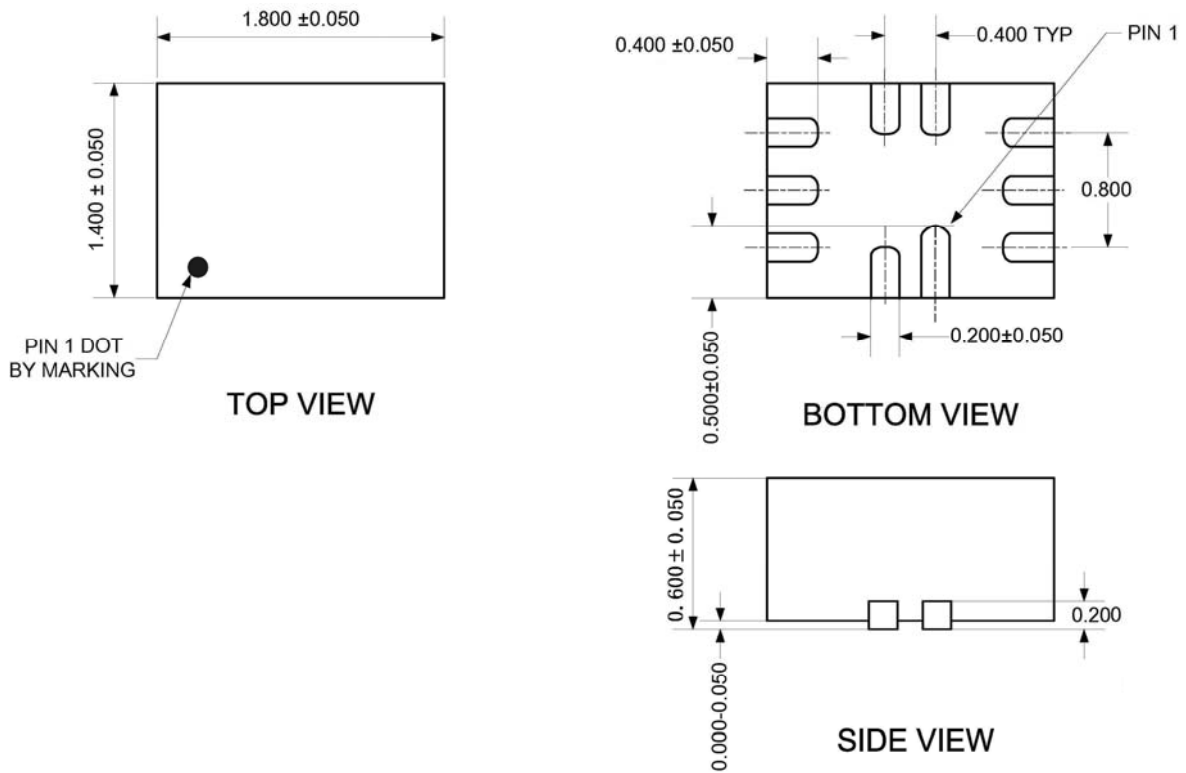


High Speed Signal Quality Eye Diagram Test (VCC=3.3V)

ORDER INFORMATION

Product Code	Order NO.	material	package	Package option
CW211	CW211AQFX	Pb-Free	UT-QFN-10	Tape and Real, 3000

PACKAGE OUTLINE DIMENSIONS (unit: mm)



(UT-QFN10: 1.4mm×1.8mm×0.6mm)

CONTACT INFORMATION

Support: service@chipwiser.com

VERSION HISTORY

DDCN	Version	Revisions	Date
CW-090100903	1.0	Initial Datasheet Create	2009-10-9
CW-100600002	1.1	Update some parameters' test result: ESD Level, Package Dimensions.	2010-04-26