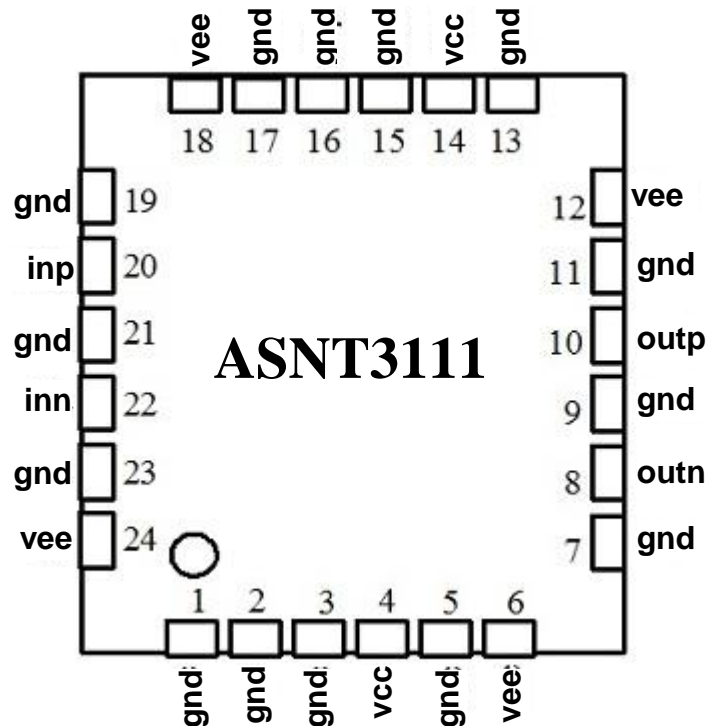




## ASNT3111-PQC DC-20Gbps Single-Channel CML-to-PCML Level Shifter

- High-speed broadband digital signal level up-shifter
- Fully differential input CML interface with on-chip single-ended 50 $\Omega$  termination to ground
- Fully differential output PCML interface with on-chip single-ended 50 $\Omega$  termination to the positive supply rail
- Exhibits low jitter and limited temperature variation over industrial temperature range
- Fabricated in SiGe for high performance, yield, and reliability
- Power consumption: 260mW
- Standard 24-pin QFN package



## DESCRIPTION

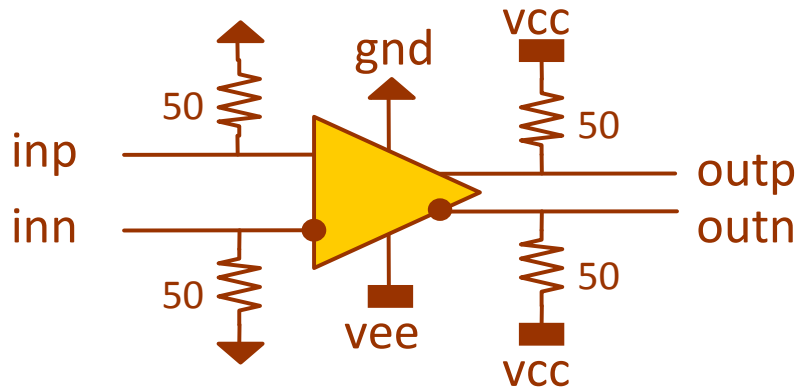


Fig. 1. Functional Block Diagram

The ASNT3111-PQC SiGe IC shown in Fig. 1 provides a voltage shift for high-speed data and clock CML signals from the levels associated with negative power supplies to the levels associated with positive power supplies.

The part's inputs support the CML logic interface with on chip 50 $\Omega$  termination to gnd and may be used differentially, AC/DC coupled, single-ended, or in any combination. In the first mode, the input signal's common mode voltage should comply with the specifications shown in ELECTRICAL CHARACTERISTICS. In the second mode, the input termination provides the required common mode voltage automatically. The part's outputs support the PCML logic interface with on chip 50 $\Omega$  termination to vcc and may be used differentially, AC/DC coupled, single-ended, or in any combination. The differential DC signaling is recommended for optimal performance.

Fig. 2 and Fig. 3 below demonstrate the chip's simulated performance.

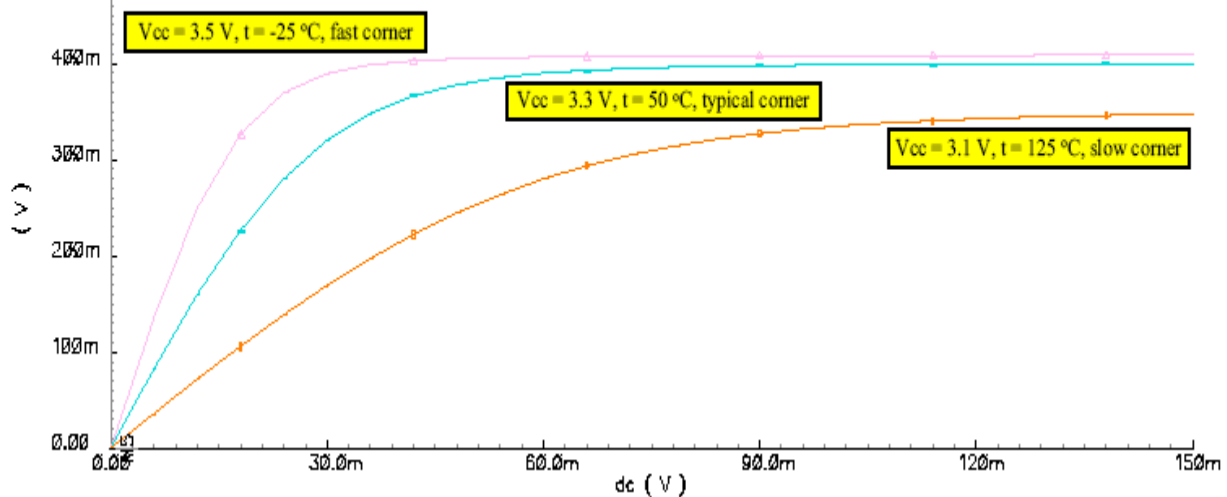


Fig. 2. Simulated DC Transfer Function



Level Converter 40 GBs (extracted)  
(Vcc = 3.1 V, t = 125 °C, slow corner;  
Vcc = 3.5 V, t = -25 °C, fast corner)

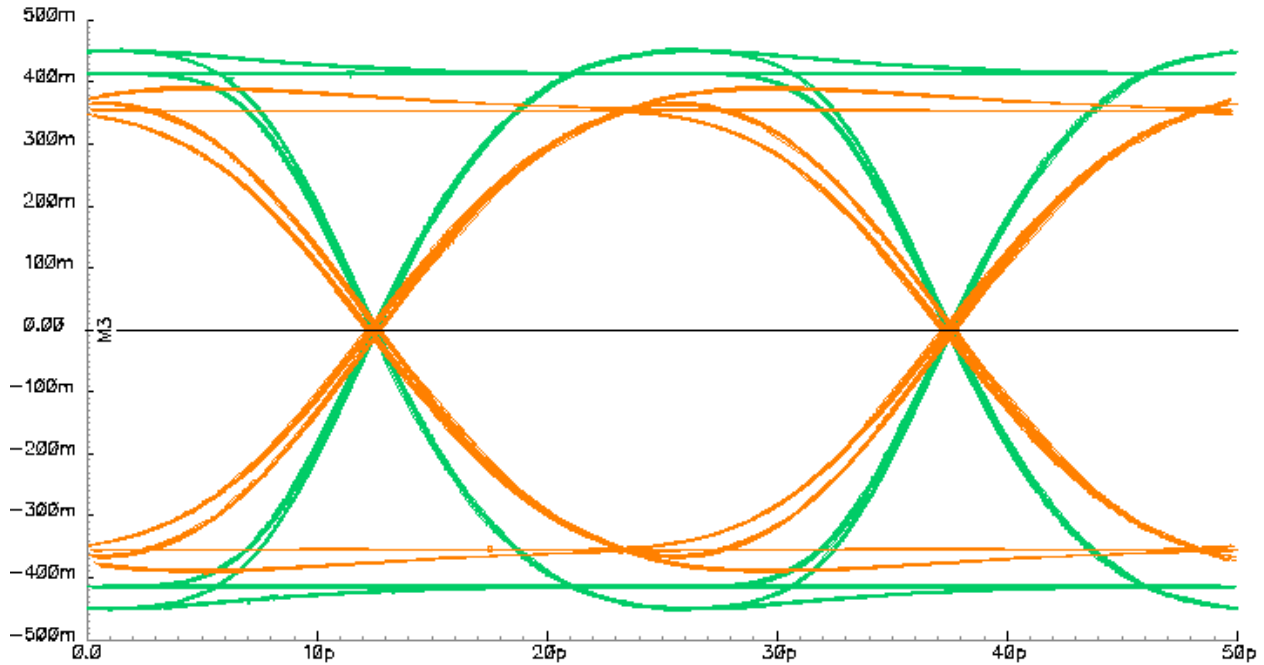


Fig. 3. 40Gbps Simulated Output Eye Diagrams at Different Conditions

## POWER SUPPLY CONFIGURATION

The chip operates from two independent power supplies related to gnd: negative vee=-3.3V and positive vcc=+3.3V.

## ABSOLUTE MAXIMUM RATINGS

Caution: Exceeding the absolute maximum ratings shown in Table 1 may cause damage to this product and/or lead to reduced reliability. Functional performance is specified over the recommended operating conditions for power supply and temperature only. AC and DC device characteristics at or beyond the absolute maximum ratings are not assumed or implied. All min and max voltage limits are referenced to ground.

Table 1. Absolute Maximum Ratings

Parameter	Min	Max	Units
Negative Supply Voltage (vee)		-3.6	V
Positive Supply Voltage (vcc)		+3.6	V
Power Consumption		0.29	W
RF Input Voltage Swing (SE)		1.0	V
Storage Temperature	-40	+100	°C
Operational Humidity	10	98	%
Storage Humidity	10	98	%



## TERMINAL FUNCTIONS

TERMINAL			DESCRIPTION
Name	No.	Type	
inp	20	CML input	Differential inputs with internal SE 50Ohm termination to gnd
inn	22		
outp	10	PCML output	Differential outputs with internal SE 50Ohm termination to vcc. Require external SE 50Ohm termination to vcc
outn	8		
Supply and Termination Voltages			
Name	Description		Pin Number
vcc	Positive power supply (+3.3V)		4, 14
gnd	External ground (0V)		1, 2, 3, 5, 7, 9, 11, 13, 15, 16, 17, 19, 21, 23
vee	Negative power supply (-3.3V)		6, 12, 18, 24

## ELECTRICAL CHARACTERISTICS

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
General Parameters					
vee	-3.1	-3.3	-3.5	V	±6%
gnd		0.0		V	External ground
vcc	3.1	3.3	3.5	V	±6%
I <sub>gnd</sub>		42		mA	
I <sub>vcc</sub>		18		mA	
Power consumption		260		mW	
Junction temperature	-25	50	125	°C	
HS Input Data (inp/inn)					
Data rate	DC		20	Gbps	
Swing	0.05		1.0	V	Differential or SE, p-p
CM Voltage Level	vcc-0.8		vcc	V	Must match for both inputs
HS Output Data (outp/outn)					
Data rate	DC		20	Gbps	
Logic "1" level		vcc		V	
Logic "0" level		vcc-0.4		V	With external 50Ohm DC termination
Rise/Fall times		14		ps	20%-80%
Additive Jitter			<1	ps	Peak-to-peak





## REVISION HISTORY

Revision	Date	Changes
2.0.1	03-2013	Corrected title Updated description Added pin out diagram Added power supply configuration section Added absolute maximum ratings section Revised electrical characteristics Revised package information section Added package mechanical drawing
1.1.1	01-2013	Revised electrical characteristics section Revised package information section
1.0	11-2011	First release