

NCT5914W

Nuvoton

4-bit LVTTTL to GTL transceiver

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1. GENERAL DESCRIPTION

The NCT5914W is a 4-bit translating transceiver designed for 3.3V LVTTTL system interface with a GTL-/GTL/GTL+ bus.

The direction pin allows the part to function as either a GTL voltage level to LVTTTL voltage level or as a LVTTTL voltage level to GTL voltage level.

The NCT5914W LVTTTL input pins and direction pin are both tolerant up to 5.5V allowing direction access to TTL or 5V CMOS voltage inputs. The LVTTTL outputs are not 5.5V tolerant. NCT5914W GTL inputs and outputs operate up to 3.6V, allowing the device to be used in higher voltage open-drain output application.

NCT5914W's V_{ref} tracks down to 0.5V for low voltage CPU and the propagation delays are about 5ns at output capacitance about 50pF for GTL to LVTTTL, the propagation delays are more short for LVTTTL to GTL.

2. FEATURES

- Operates as a 4-bit GTL-/GTL/GTL+ sample receiver or as a LVTTTL to GTL-/GTL/GTL+ driver
- 3.0V to 3.6V operation with 5V tolerant LVTTTL input
- GTL input and output 3.6V tolerant
- V_{ref} adjustable from 0.5V to $V_{CC}/2$
- ESD protection exceeds 2000V HBM and 1000V CDM
- Latch-up protection exceeds 500mA
- Package type: TSSOP14, Halogen free

3. FUNCTIONAL DIAGRAM

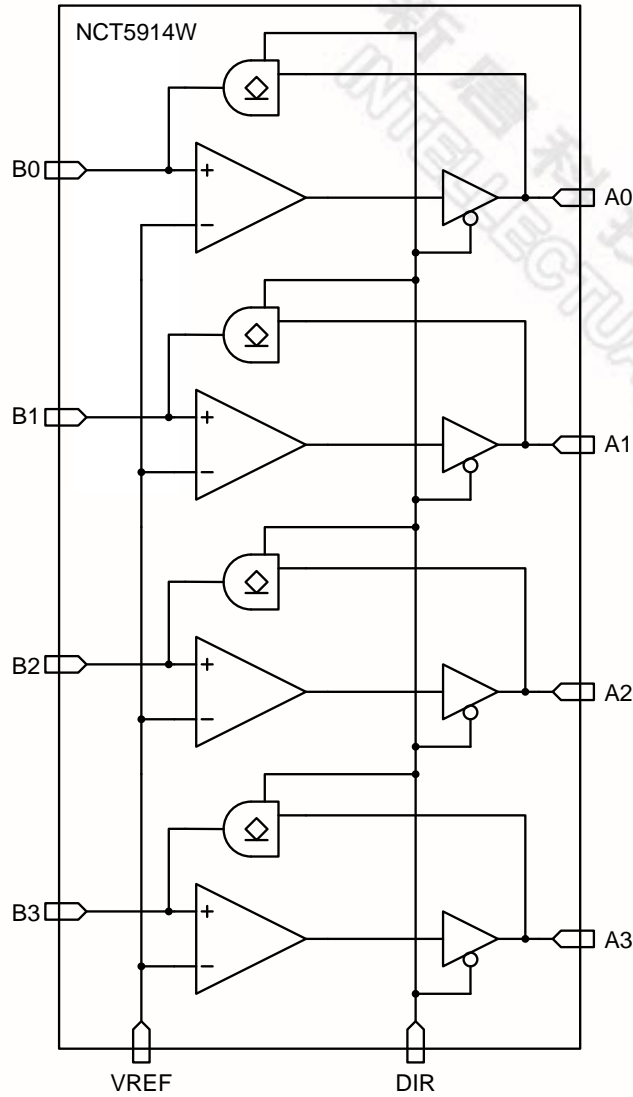
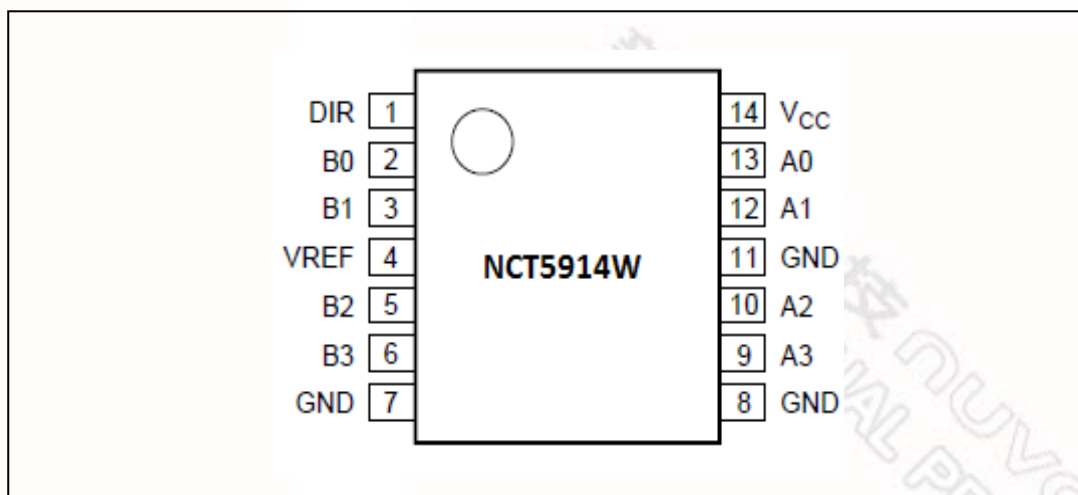


Fig1. Functional Diagram

4. PIN CONFIGURATION



4.1 PIN DESCRIPTION

PIN	NAME	DESCRIPTION
1	DIR	Direction control input (LVTTTL)
2	B0	Data input/output (GTL)
3	B1	Data input/output (GTL)
4	VREF	GTL reference voltage
5	B2	Data input/output (GTL)
6	B3	Data input/output (GTL)
7	GND	Ground (0V)
8	GND	Ground (0V)
9	A3	Data input/output (LVTTTL)
10	A2	Data input/output (LVTTTL)
11	GND	Ground (0V)
12	A1	Data input/output (LVTTTL)
13	A0	Data input/output (LVTTTL)
14	VCC	Positive supply voltage

5. FUNCTIONAL DESCRIPTION

5.1 Function table

INPUT	INPUT/OUTPUT	
DIR	A (LVTTTL)	B (GTL)
HIGH VOLTAGE	input	$B_n = A_n$
LOW VOLTAGE	$A_n = B_n$	input

6. LIMITING VALUES

Voltage are reference to GND (ground = 0V)

SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNIT
V_{CC}	Supply voltage		-0.5	4	V
I_{IK}	Input clamping current	$V_I < 0$	-	-50	mA
V_I	Input voltage	A port	-0.5	6	V
		B port	-0.5	4	V
I_{OK}	Output clamping current	A port; $V_O < 0V$	-	-50	mA
V_O	Output voltage	Output in OFF or High state			
		A port	-0.5	6	V
		B port	-0.5	4	V
I_{OL}	LOW-level output current	Current into any output in the LOW state			
		A port	-	32	mA
		B port	-	80	mA
I_{OH}	HIGH-level output current	Current into any output in the HIGH state; A port	-	-32	mA
Tstg	Storage temperature		-50	150	°C

7. RECOMMENDED OPERATING CONDITIONS ^[1]

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CC}	Supply voltage		3.0	-	3.6	V
V _{TT}	Termination voltage ^[2]	GTL-	0.85	0.9	0.95	V
		GTL	1.14	1.2	1.26	V
		GTL+	1.35	1.5	1.65	V
V _{ref}	Reference voltage	Overall	0.5	2/3V _{TT}	V _{CC} /2	V
		GTL-	0.5	0.6	0.63	V
		GTL	0.76	0.8	0.84	V
		GTL+	0.87	1	1.1	V
V _I	Input voltage	B port	0	V _{TT}	3.6	V
		Except B port	0	3.3	5.5 ^[3]	V
V _{IH}	HIGH-level input voltage	B port	V _{ref} +50m	-	-	V
		Except B port	2	-	-	V
V _{IL}	LOW-level input voltage	B port	-	-	V _{ref} +50m	V
		Except B port	-	-	0.8	V
I _{OH}	HIGH-level output current	A port	-	-	-16	mA
I _{OL}	LOW-level output current	B port	-	-	40	mA
		A port	-	-	16	mA
T _{amb}	Ambient temperature	Operating in free-air	-40	-	85	°C

[1]. Unused inputs must be held HIGH or LOW to prevent them from floating.

[2]. V_{TT} maximum of 3.6V with resistor size so IOL maximum is not exceeded.

[3]. A0, A1, A2, A3 V_{I(max)} is 3.6V if configured as output (DIR=LOW).

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8. STATIC CHARACTERISTICS

Typical value are measured at $V_{CC}=3.3V$ and $T_{amb} = 25^{\circ}C$.

All voltage are reference to GND (ground =0 V)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{OH}	HIGH-level output voltage	A port; V _{CC} =3.0V to 3.6V; I _{OH} =-100uA ^[1]	V _{CC} -0.2	-	5.5	V
		A port; V _{CC} =3.0V ; I _{OH} =-16mA ^[1]	2	-	-	V
V _{OL}	LOW-level output voltage	B port; V _{CC} =3.0V ; I _{OL} =40mA ^[1]	-	0.23	0.4	V
		A port; V _{CC} =3.0V ; I _{OL} =16mA ^[1]	-	0.55	0.8	V
I _I	Input current	Control inputs; V _{CC} =3.6V; V _I =V _{CC} or GND	-	-	±1	uA
		B port; V _{CC} =3.6; V _I =V _{TT} or GND	-	-	±1	uA
		A port; V _{CC} =0V or 3.6; V _I =5.5V	-	-	10	uA
		A port; V _{CC} =3.6V; V _I =V _{CC}	-	-	±1	uA
		A port; V _{CC} =3.6V; V _I =0V	-	-	-5	uA
I _{OZ}	OFF-state output current	A port; V _{CC} =0V; V _I or V _O =0V to 3.6V	-	-	±100	uA
I _{CC}	Quiescent supply current	A port; V _{CC} =3.6V; V _I =V _{CC} or GND; I _O =0mA	-	4	10	mA
		B port; V _{CC} =3.6V; V _I =V _{TT} or GND; I _O =0mA	-	4	10	mA
ΔI _{CC} ^[3]	additional quiescent current (per input)	Aport or control inputs; V _{CC} =3.6V; V _I =V _{CC} -0.6V	-	-	500	uA
C _i	Input capacitance	Control inputs; V _I =3.0V or 0V	-	2	2.5	pF
C _O	Input/output capacitance	A port; V _O =3.0V or 0V	-	8	12	pF
		B port; V _O =V _{TT} or 0V	-	2	4	pF

[1] The input and output voltage rating may be exceeded if the input and output current rating are observed.

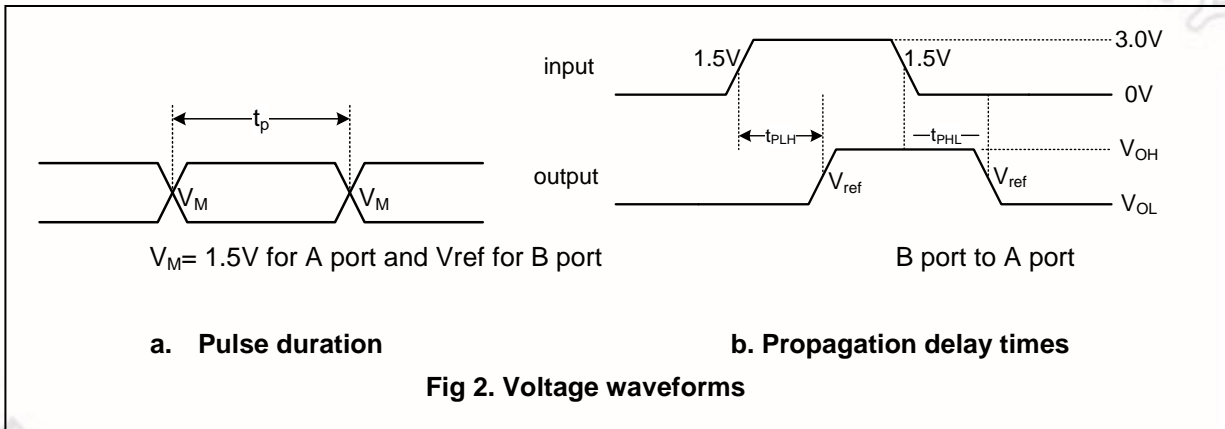
[2] This is the increase in supply current for each input that is at the specified TTL voltage level rather than V_{CC} or GND



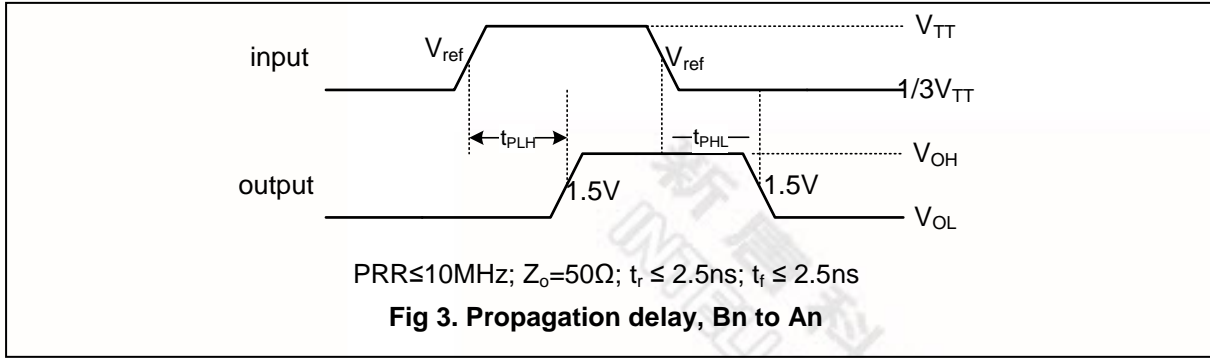
9. DYNAMIC CHARACTERISTICS

VCC = 3.3V ± 0.3

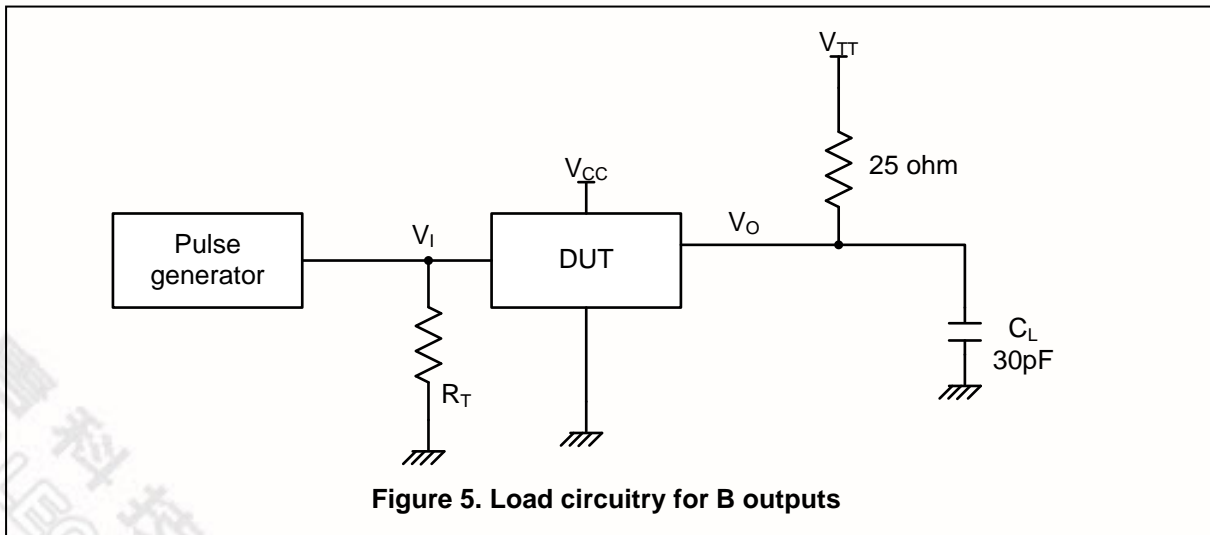
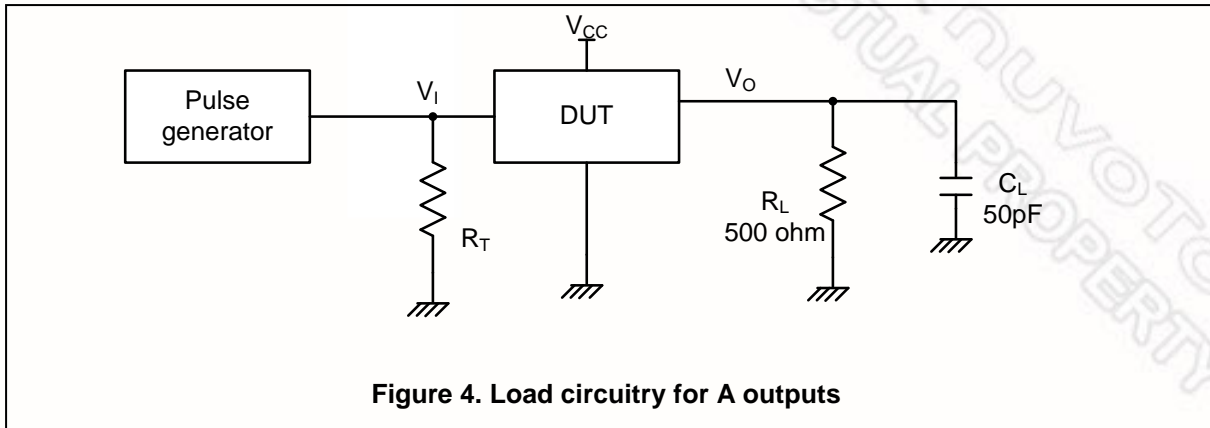
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
GTL-; V _{ref} = 0.6V; V _{TT} =0.9V						
t _{PLH}	LOW to HIGH propagation delay	An to Bn; see Fig2	-	2.8	5	ns
t _{PHL}	HIGH to LOW propagation delay	An to Bn; see Fig2	-	3.3	7	ns
t _{PLH}	LOW to HIGH propagation delay	Bn to An; see Fig3	-	5.3	8	ns
t _{PHL}	HIGH to LOW propagation delay	Bn to An; see Fig3	-	5.2	8	ns
GTL; V _{ref} = 0.8V; V _{TT} =1.2V						
t _{PLH}	LOW to HIGH propagation delay	An to Bn; see Fig2	-	2.8	5	ns
t _{PHL}	HIGH to LOW propagation delay	An to Bn; see Fig2	-	3.4	7	ns
t _{PLH}	LOW to HIGH propagation delay	Bn to An; see Fig3	-	5.2	8	ns
t _{PHL}	HIGH to LOW propagation delay	Bn to An; see Fig3	-	4.9	7	ns
GTL; V _{ref} = 1.0V; V _{TT} =1.5V						
t _{PLH}	LOW to HIGH propagation delay	An to Bn; see Fig2	-	2.8	5	ns
t _{PHL}	HIGH to LOW propagation delay	An to Bn; see Fig2	-	3.4	7	ns
t _{PLH}	LOW to HIGH propagation delay	Bn to An; see Fig3	-	5.1	8	ns
t _{PHL}	HIGH to LOW propagation delay	Bn to An; see Fig3	-	4.7	7	ns



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9.1 Test Information



10. ORDER INSTRUCTION

PART NO.	PACKAGE	SUPPLIED AS
NCT5914W	TSSOP-14 Halogen free	E shape for Tube T shape for T& R

11. TOP MARKING SPECIFICATION



1st line : Nuvoton Logo

2nd line : Part number: NCT5914W

3rd line : Assembly tracking code

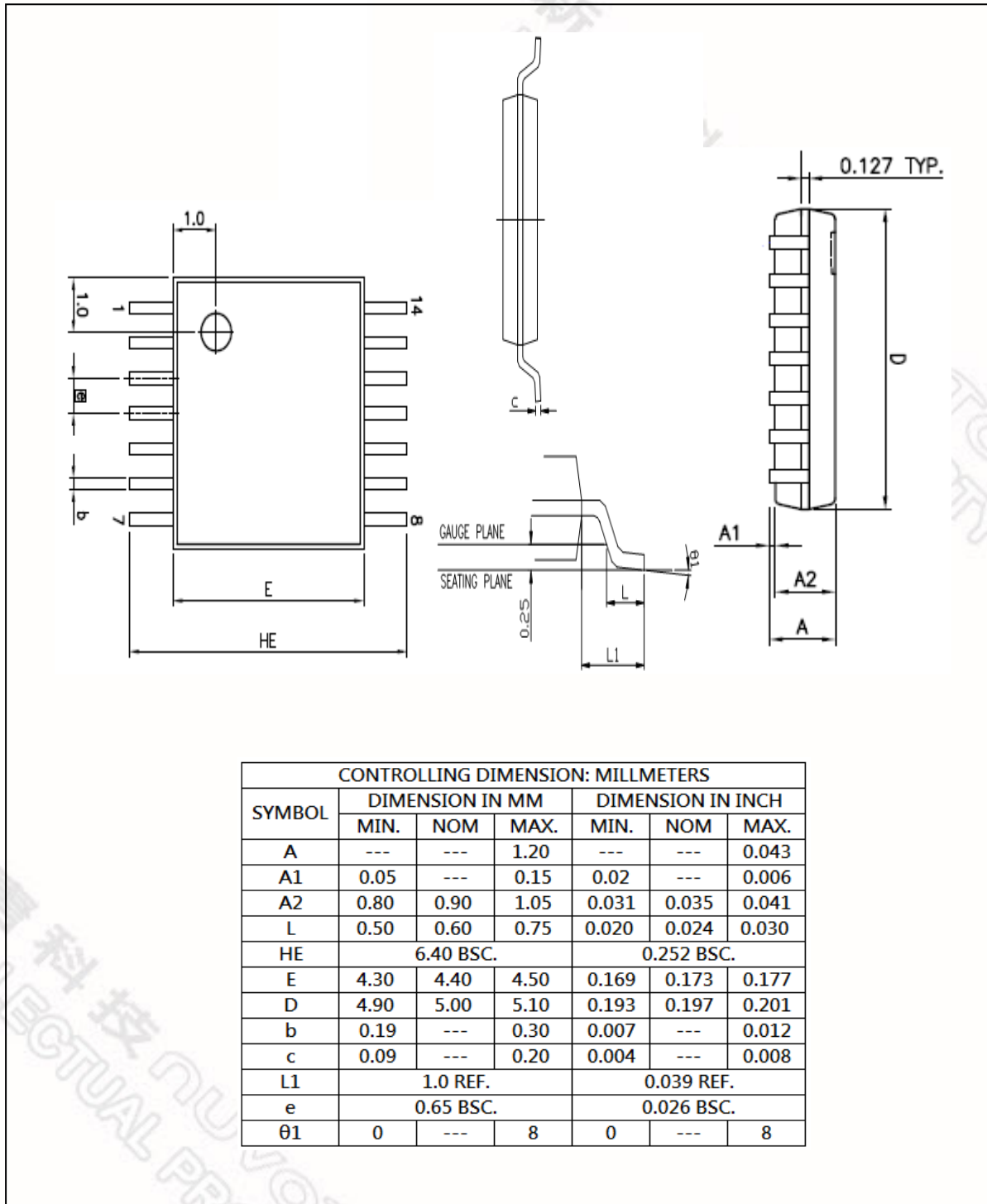
3 15 : packages made in year 2013, week 15

G : Assembly house code

xxx : Nuvoton internal use code

12. PACKAGE DRAWING AND DIMENSIONS

TSSOP 14L 4.4x5.0 mm²



13. DATASHEET REVISION HISTORY

	PAGES	DATES	VERSION	MAIN CONTENTS
1		2012/05/30	0.1	Draft version.
2		2012/06/05	0.2	1. Modify Fig1 2. Modify conditions and typical value in dynamic characteristics table 3. Insert Vref=0.5V and V _{TT} =0.75 dynamic characteristics
3	4	2012/07/01	0.3	Update the limiting values
4	All	2013/05/08	0.5	All versions before 0.5 are draft version Update the VOL spec and unit Update the Dynamic characteristics spec
5	3	2013/06/03	0.51	Updated the pin configuration (pin number typo)
		2013/06/14	1.0	Updated the version to V1.0

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