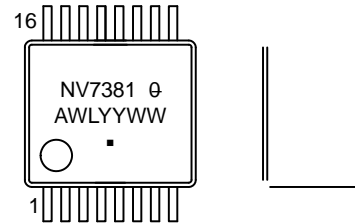


# FlexRay® Transceiver, Clamp 30

NCV7381



## MARKING DIAGRAM



A = Assembly Location  
 WL = Wafer Lot  
 YYWW = Year / Work Week  
 ■ = Pb Free Package

## KEY FEATURES

### General

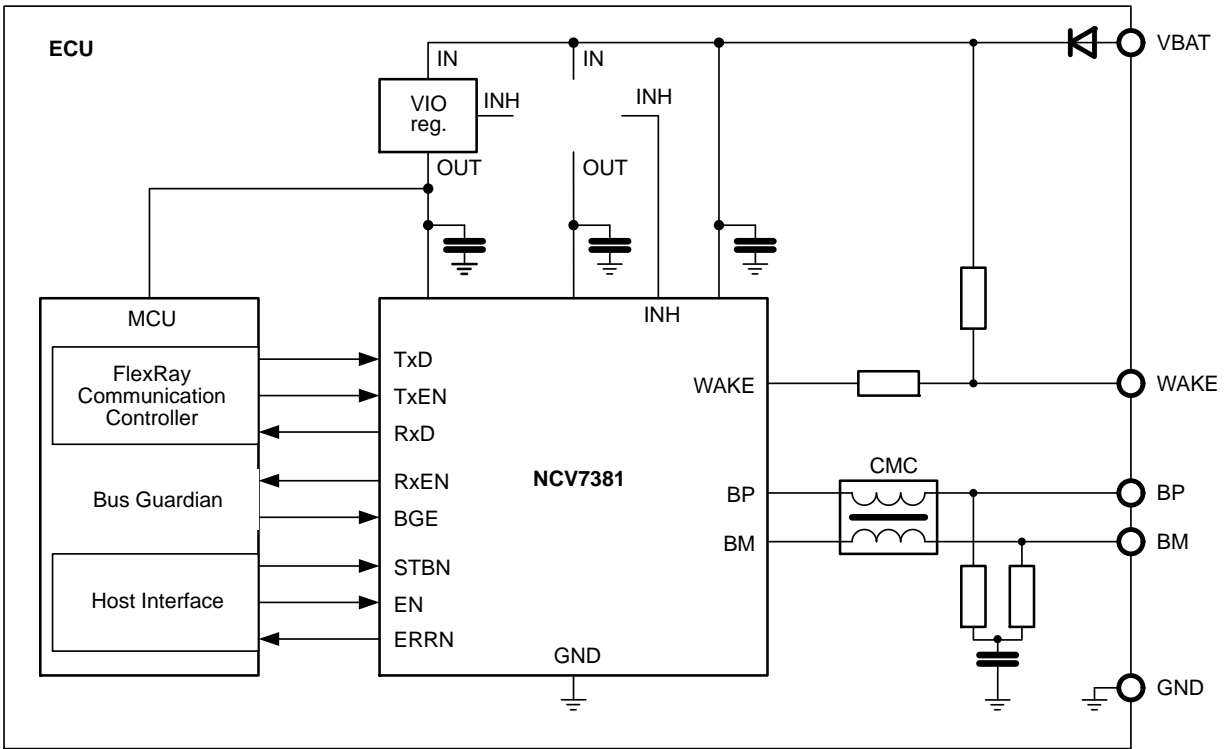
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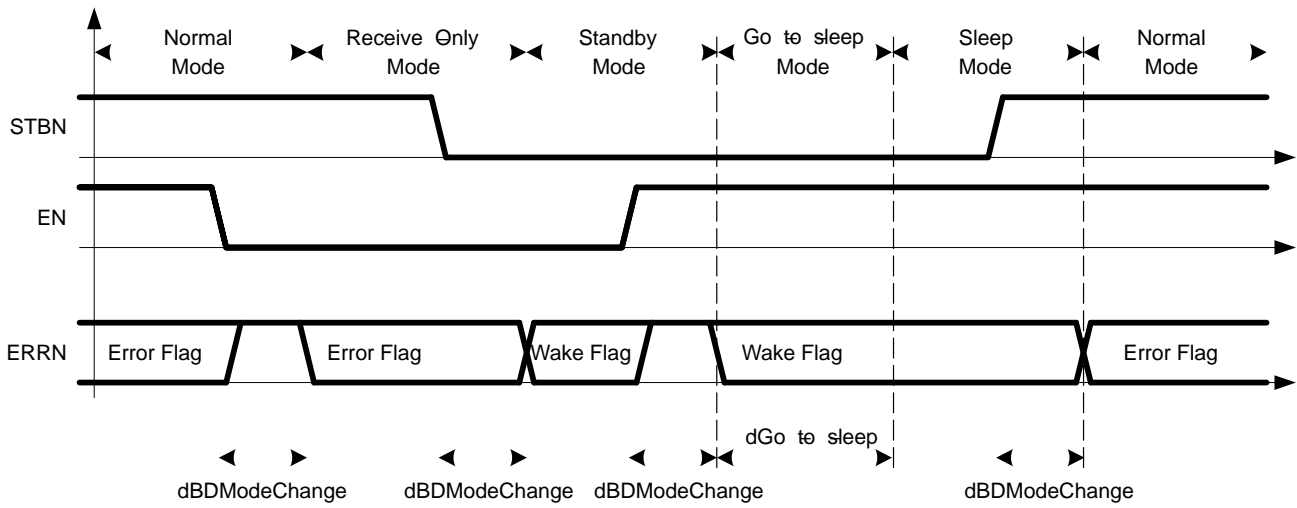
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## APPLICATION INFORMATION





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**Figure 4. Timing Diagram of Operating Modes Control by the STBN and EN Pins**

Internal Flags

Table 3. INTERNAL FLAGS

Flag	Set Condition	Reset Condition	Comment
Local Wakeup	Low level detected on WAKE pin in a low power mode	Low power mode is entered	
Remote Wakeup	Remote wakeup detected on the bus in a low power mode	Low power mode is entered	
Wakeup	Local Wakeup flag changes to set or Remote Wakeup flag changes to set	Normal mode is entered or Low power mode is entered or Any under voltage flag becomes set	
Power on	Internal power supply of the chip becomes sufficient for the operation of the control logic	Normal mode is entered	
Thermal Warning	Junction temperature is higher than $T_{jw}$ (typ. 140°C) in a normal power mode and $V_{BAT}$ is not in under voltage	(Junction temperature is below $T_{jw}$ in a normal power mode or the status register is read in a low power mode) and $V_{BAT}$ is not in under voltage	The thermal warning flag has no influence on the bus driver function
Thermal Shutdown	Junction temperature is higher than $T_{jwd}$ (typ. 165°C) in a normal power mode and $V_{BAT}$ is not in under voltage	Junction temperature is below $T_{jwd}$ in a normal power mode and falling edge on TxEN and $V_{BAT}$ is not in under voltage	The transmitter is disabled as long as the thermal shutdown flag is set
TxEN Timeout	TxEN is Low for longer than $t_{TxENActiveMax}$ (typ. 1.5 ms) and bus driver is in Normal mode	TxEN is High or Normal mode is left	The transmitter is disabled as long as the timeout flag is set
Bus Error	Transmitter is enabled and Data on bus are different from TxD signal (sampled after each TXD edge)	(Transmitter is enabled and Data on bus are identical to TxD signal) or Transmitter is disabled	The bus error flag has no influence on the bus driver function
$V_{BAT}$ Under voltage	$V_{BAT}$ is below the under voltage threshold for longer than $t_{BDRV_{BAT}}$	$V_{BAT}$ is above the under voltage threshold for longer than $t_{BDRV_{BAT}}$ or Wake flag becomes set	
$V_{CC}$ Under voltage	$V_{CC}$ is below the under voltage threshold for longer than $t_{BDRV_{CC}}$	$V_{CC}$ is above the under voltage threshold for longer than $t_{BDRV_{CC}}$ or Wake flag becomes set	
$V_{IO}$ Under voltage	$V_{IO}$ is below the under voltage threshold for longer than $t_{BDRV_{IO}}$	$V_{IO}$ is above the under voltage threshold for longer than $t_{BDRV_{IO}}$ or Wake flag becomes set	
Error	Any of the following status bits is set: <ul style="list-style-type: none"> <li>• Bus error</li> <li>• Thermal Warning</li> <li>• Thermal Shutdown</li> <li>• TxEN Timeout</li> <li>• <math>V_{BAT}</math> Under voltage</li> <li>• <math>V_{CC}</math> Under voltage</li> <li>• <math>V_{IO}</math> Under voltage</li> </ul>	All of the following status bits are reset: <ul style="list-style-type: none"> <li>• Bus error</li> <li>• Thermal Warning</li> <li>• Thermal Shutdown</li> <li>• TxEN Timeout</li> <li>• <math>V_{BAT}</math> Under voltage</li> <li>• <math>V_{CC}</math> Under voltage</li> <li>• <math>V_{IO}</math> Under voltage</li> </ul>	

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## Operating Mode Changes Caused by Internal Flags

## FlexRay Bus Driver

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- -
- - -
- - -

Bus Guardian Interface

Bus Driver Voltage Regulator Control

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ERRN Pin and Status Register

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Table 6. SIGNALING ON ERRN PIN

STBN	EN	Conditions	Error flag	Wake flag	ERRN
High	High	-	not set	x	High
			set	x	Low
High	Low	EN has been set to High after previous wakeup	not set	x	High
			set	x	Low
		EN has not been set to High after previous wakeup	x	Set local	High
			x	Set remote	Low
Low	x	-	x	not set	High

HighH.307 refBT8 0 0 8 443

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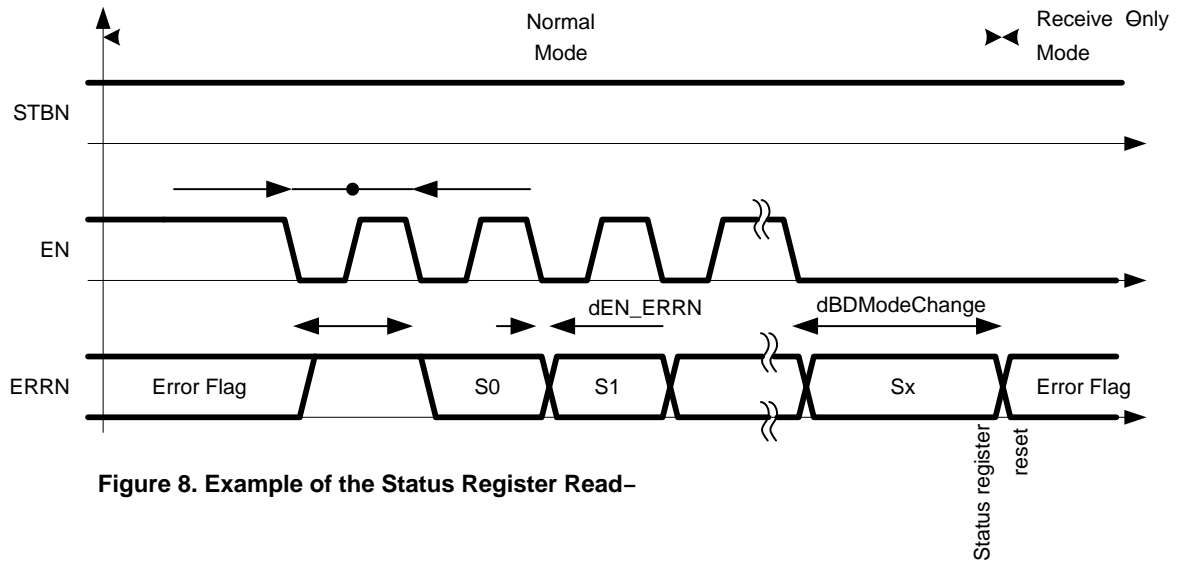


Figure 8. Example of the Status Register Read-

**Table 8. ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Min	Max	Units
$uV_{BAT\_MAX}$	Battery voltage power supply	0.3	50	V
$uV_{CC\_MAX}$	5 V Supply voltage	0.3	5.5	V
$uV_{IO\_MAX}$	Supply voltage for $V_{IO}$ voltage level adaptation	0.3	5.5	V
$uDigiIn_{MAX}$	DC voltage at digital inputs (BGE, EN, STBN, TXD, TXEN)	0.3	5.5	V
$uDigiOut_{MAX}$	DC voltage at digital outputs (ERRN, RxD, RxEN)	0.3	$V_{IO}+0.3$	V
$iDigiOut_{IN\_MAX}$	Digital output pins input current ( $V_{IO} = 0$ V)	40	+10	mA
$uBM_{MAX}$	DC voltage at pin BM	50	50	V
$uBP_{MAX}$	DC voltage at pin BP	50	50	V
$uINH_{MAX}$	DC voltage at pin INH	0.3	$V_{BAT}+0.3$	V
$iINH_{MAX}$	INH pin maximum load current	10		

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## THERMAL CHARACTERISTICS

**Table 10. PACKAGE THERMAL RESISTANCE**

Symbol	Rating	Value	Unit
R <sub>θJA_1</sub>	Thermal Resistance Junction to Air, JEDEC 1S0P PCB	78	°C/W
R <sub>θJA_2</sub>	Thermal Resistance Junction to Air, JEDEC 2S2P PCB	69	°C/W

## ELECTRICAL CHARACTERISTICS

Table 12. TRANSMISSION PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$uBDT_{xactive}$	Differential voltage $ uBP - uBM $ when sending symbol "Data_0" or "Data_1"	$R_{BUS} = 40 - 55 \Omega$ ; $C_{BUS} = 100 \text{ pF}$	600		2000	mV
$uBDT_{xidle}$	Differential voltage $ uBP - uBM $ when driving signal "Idle"	Parameters defined in Figure 10.	0		30	mV
$dBDTx10$	Transmitter delay, negative edge	Test setup as per Figure 17 with $R_{BUS} = 40 \Omega$ ; $C_{BUS} = 100 \text{ pF}$ Sum of TXD signal rise and fall time (20% - 80% $V_{IO}$ ) of up to 9 ns			75	ns
$dBDTx01$	Transmitter delay, positive edge				75	ns
$dBDTxAsym$	Transmitter delay mismatch, $ dBDTx10 - dBDTx01 $ (Note 8)				4	ns
$dBusTx10$	Fall time of the differential bus voltage from 80% to 20%	Parameters defined in Figure 10.	6		18.75	ns
$dBusTx01$	Rise time of the differential bus voltage from 20% to 80%		6		18.75	ns
$dBusTxDif$	Differential bus voltage fall and rise time mismatch $ dBusTx10 - dBusTx01 $				3	ns
$dBDTxia$	Transmitter delay idle $\rightarrow$ active	Test setup as per Figure 17 with $R_{BUS} = 40 \Omega$ ; $C_{BUS} = 100 \text{ pF}$			75	ns
$dBDTxai$	Transmitter delay active $\rightarrow$ idle				75	ns
$dBDTxDM$	Idle - active transmitter delay mismatch $ dBDTxia - dBDTxai $				50	ns
$dBusTxia$	Transition time idle $\rightarrow$ active	Parameters defined in Figure 11.			30	ns
$dBusTxai$	Transition time active $\rightarrow$ idle				30	ns
$dTxEN_{LOW}$	Time span of bus activity		550		650	ns
$dBDTxActiveMax$	Maximum length of transmitter activation		650		2600	$\mu\text{s}$

$iBP_{DtMaxi}$

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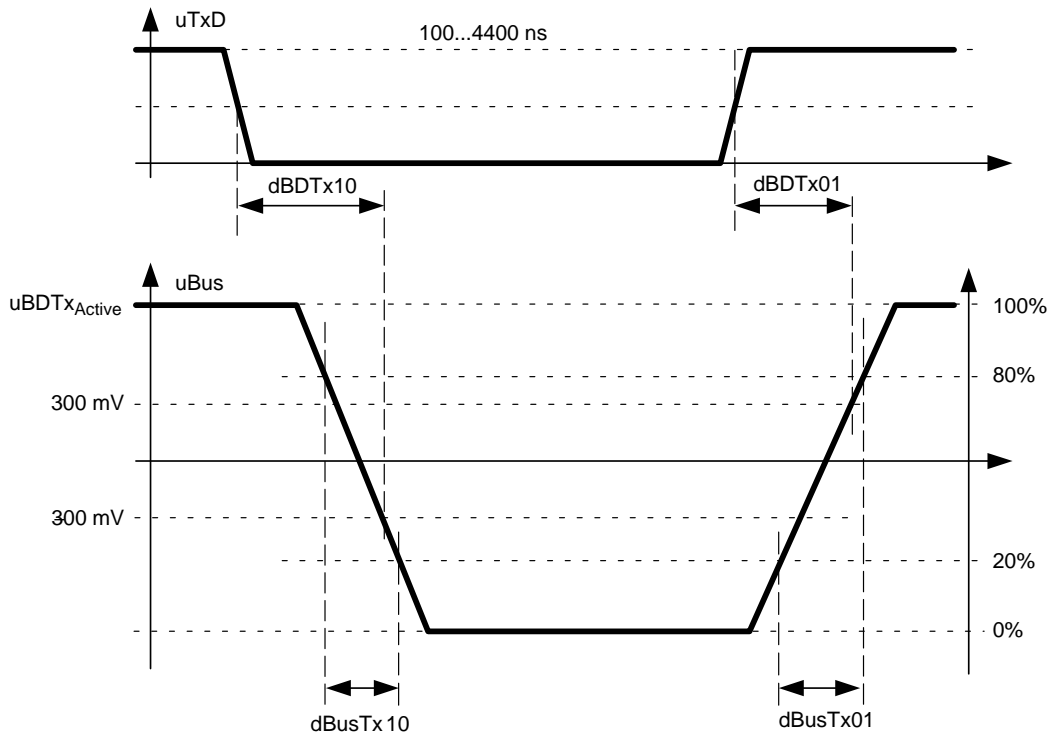


Figure 10. Transmission Parameters (TxEN is Low and BGE is High)

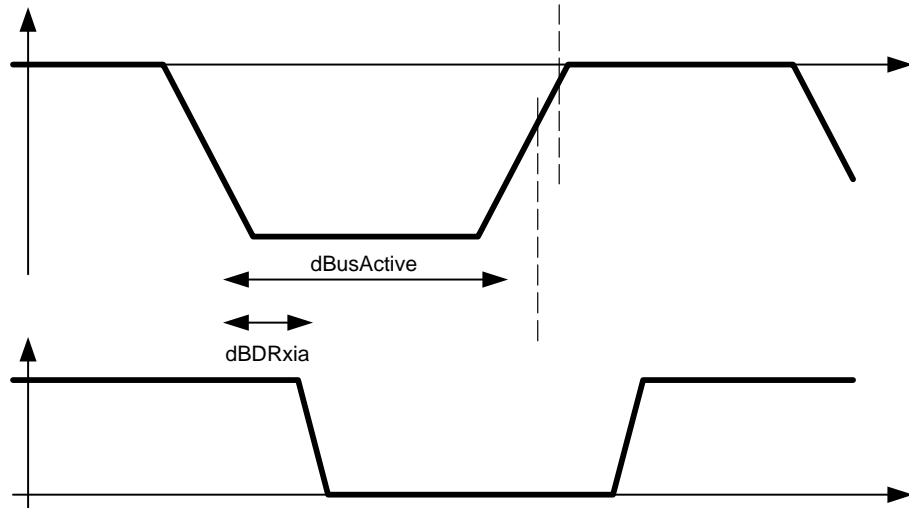
Table 13. RECEPTION PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
uData0	Receiver threshold for detecting Data_0	Activity detected				





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**Table 18. POWER SUPPLY MONITORING PARAMETERS**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
dBDUV <sub>VCC</sub>	V <sub>CC</sub> Undervoltage detection time		150	350	750	ms
dBDUV <sub>VIO</sub>	V <sub>IO</sub> Undervoltage detection time		150	350	750	ms
dBDUV <sub>VBAT</sub>	V <sub>BAT</sub> Undervoltage detection time		350	750		

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**Table 24. TxD PIN PARAMETERS**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
uBDLogic_0 uBDLogic_1	Low level input voltage		0.3		$0.4 \cdot V_{io}$	V

TYPICAL CHARACTERISTICS

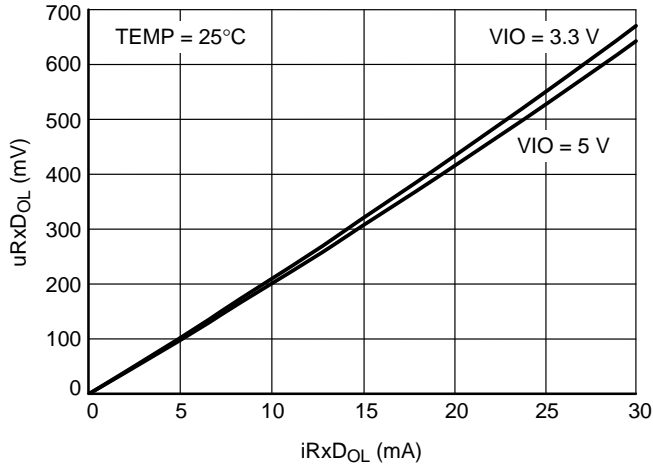


Figure 14. RxD Low Output Characteristic

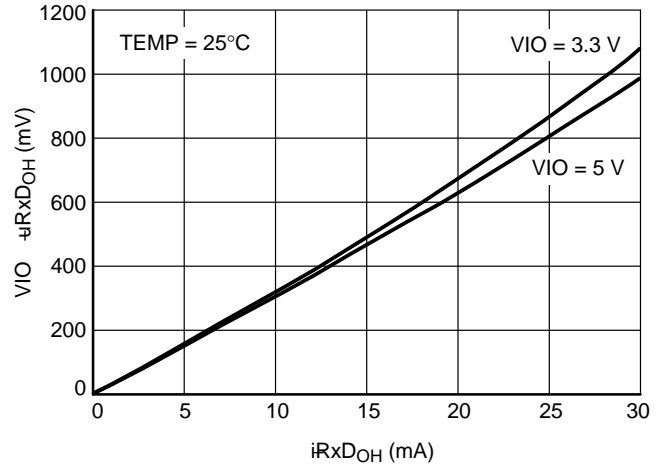


Figure 15. RxD High Output Characteristic

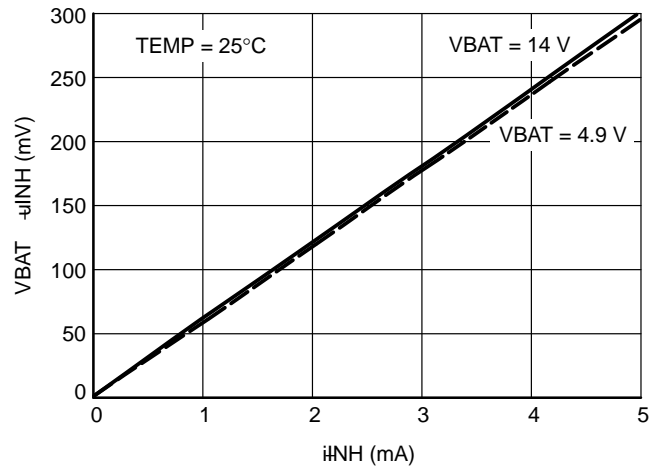


Figure 16. INH Not\_Sleep Output Characteristic

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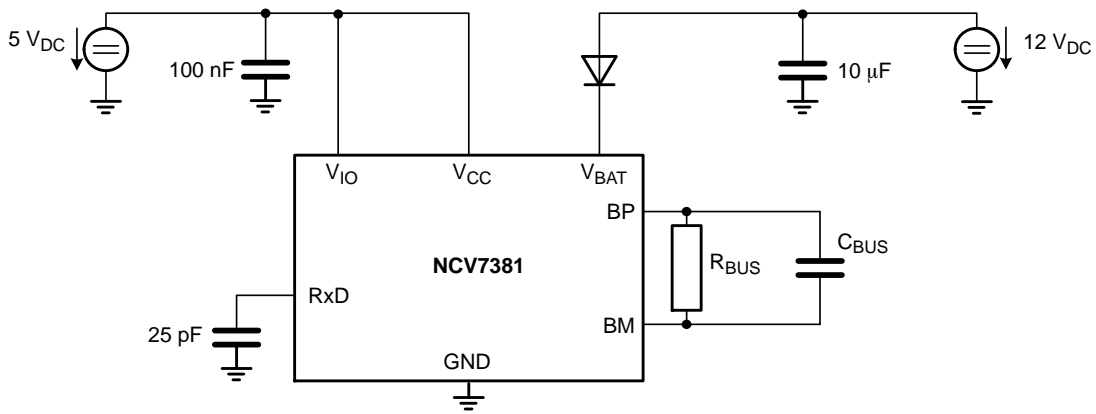


Figure 17. Test Setup for Dynamic Characteristics

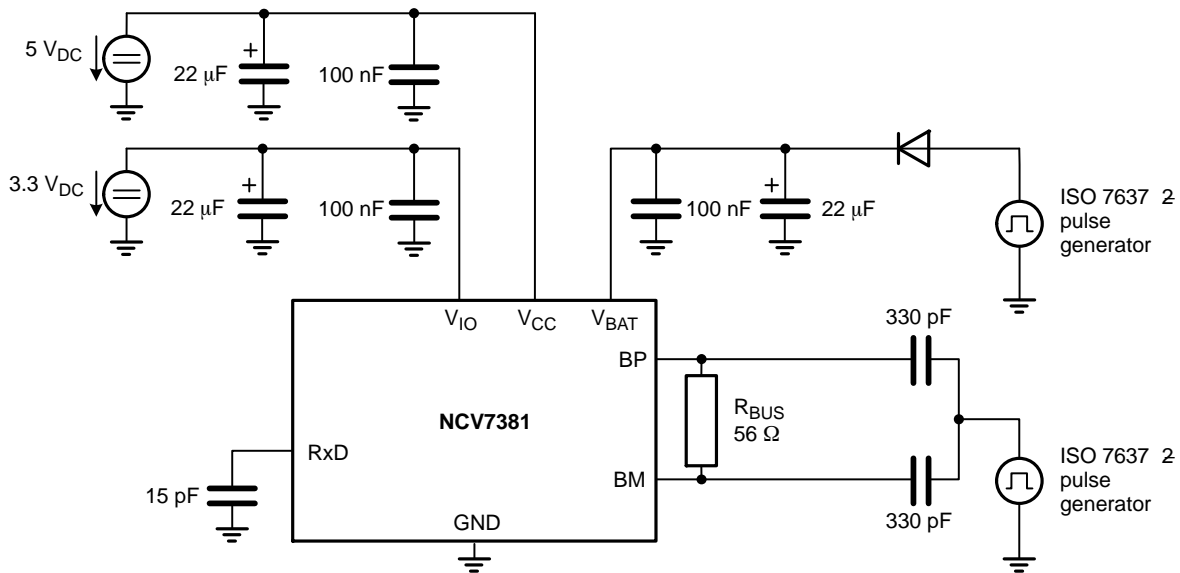


Figure 18. Test Setup for Measuring the Transient Immunity

## ORDERING INFORMATION

Part Number	Description	Temperature Range	Package	Container <sup>†</sup>	
				Type	Quantity
NCV7381ADP0R2G	Clamp 30 FlexRay Transceiver	40°C to +125°C	SSOP 16 GREEN	Tape & Reel	2000

## DISCONTINUED (Note 18)

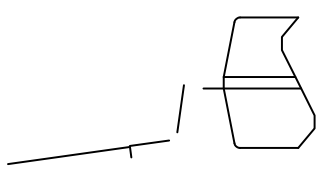
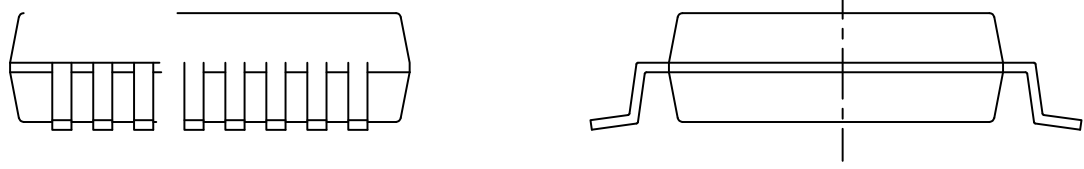
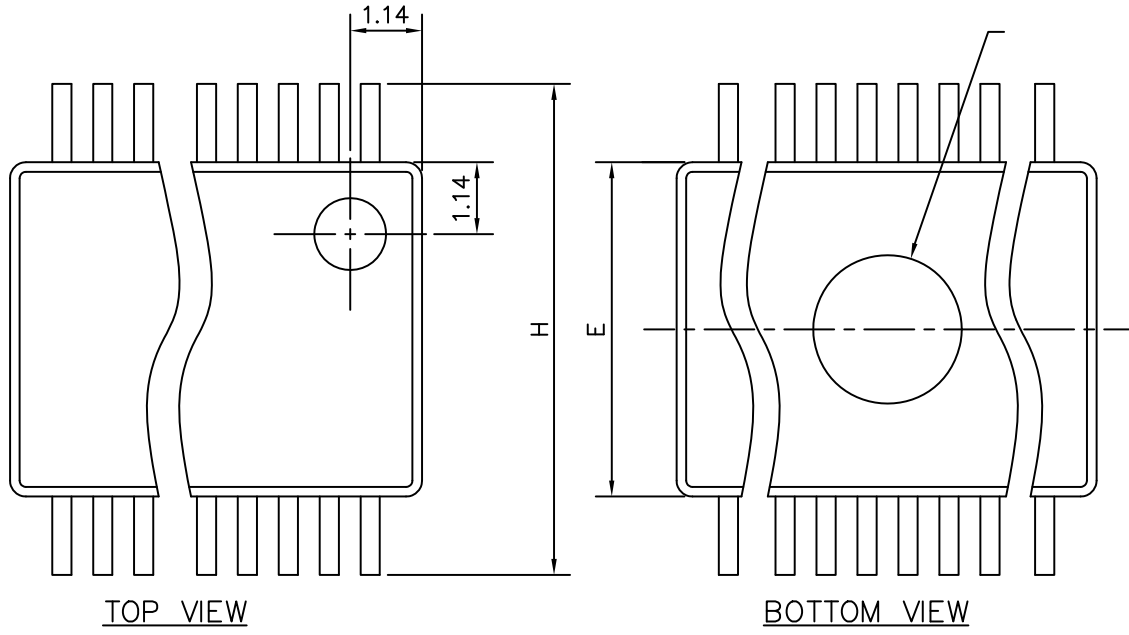
NCV7381DP0G	Clamp 30 FlexRay Transceiver	40°C to +125°C	SSOP 16 GREEN	Tube	76
NCV7381DP0R2G				Tape & Reel	2000

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

18. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on [www.onsemi.com](http://www.onsemi.com).

**SSOP 16**  
CASE 565AE  
ISSUE O

DATE 19 SEP 2008



SYMBOL	NOM.	NOTE VARIATIONS	1		
			MIN.	NOM.	MAX.
A	1.86				
A <sub>1</sub>	0.13	AA		6.20	
A <sub>2</sub>	1.68	AB		6.20	
B	-	AC		7.20	
C	0.09			0.20	
D	SEE VARIATIONS				
E	5.30				
e	0.65 BSC				
L1	1.25 REF.				
N	SEE VARIATIONS				
	4°				

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