

NCV7420

LIN Transceiver with 3.3 V or 5 V Voltage Regulation

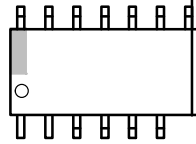
General Description

The NCV7420 is a fully featured local interconnect network (LIN) transceiver designed to interface between a LIN protocol controller and the physical bus. The transceiver is implemented in I3T technology enabling both high-voltage analog circuitry and digital functionality to co-exist on the same chip.

The NCV7420 LIN device is a member of the in-vehicle networking (IVN) transceiver family of ON Semiconductor that

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MARKING DIAGRAM



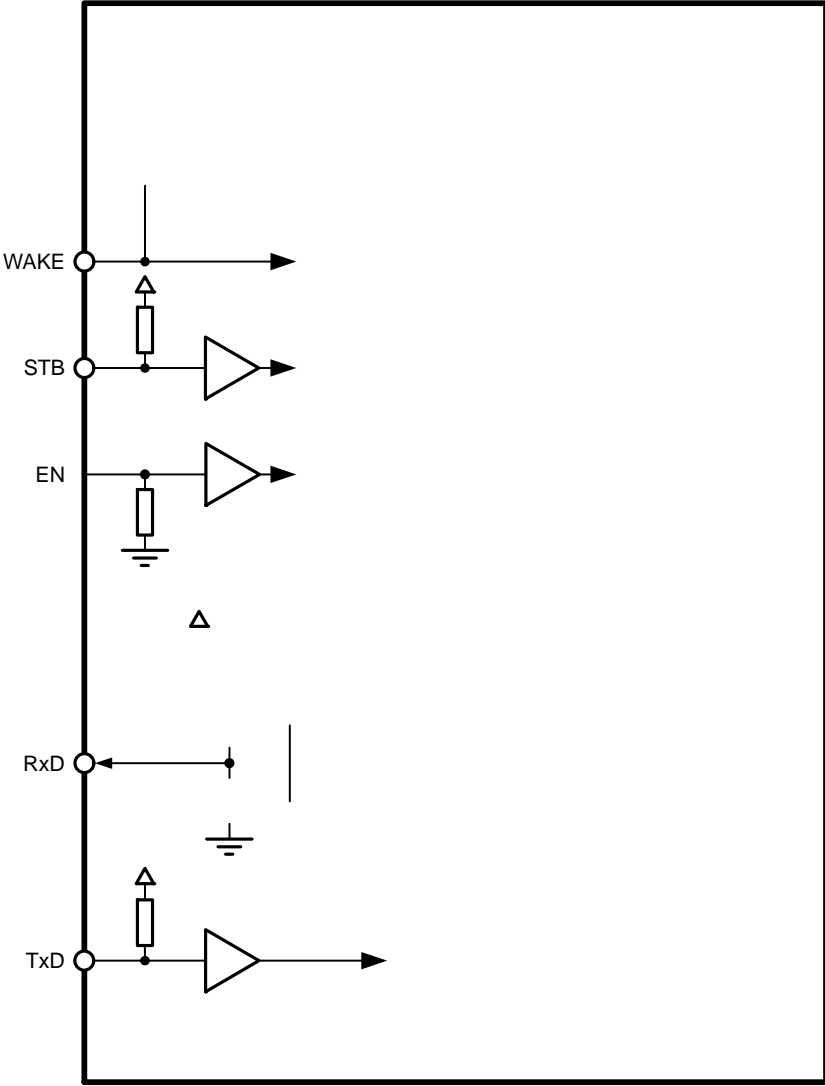


Figure 1. Block Diagram



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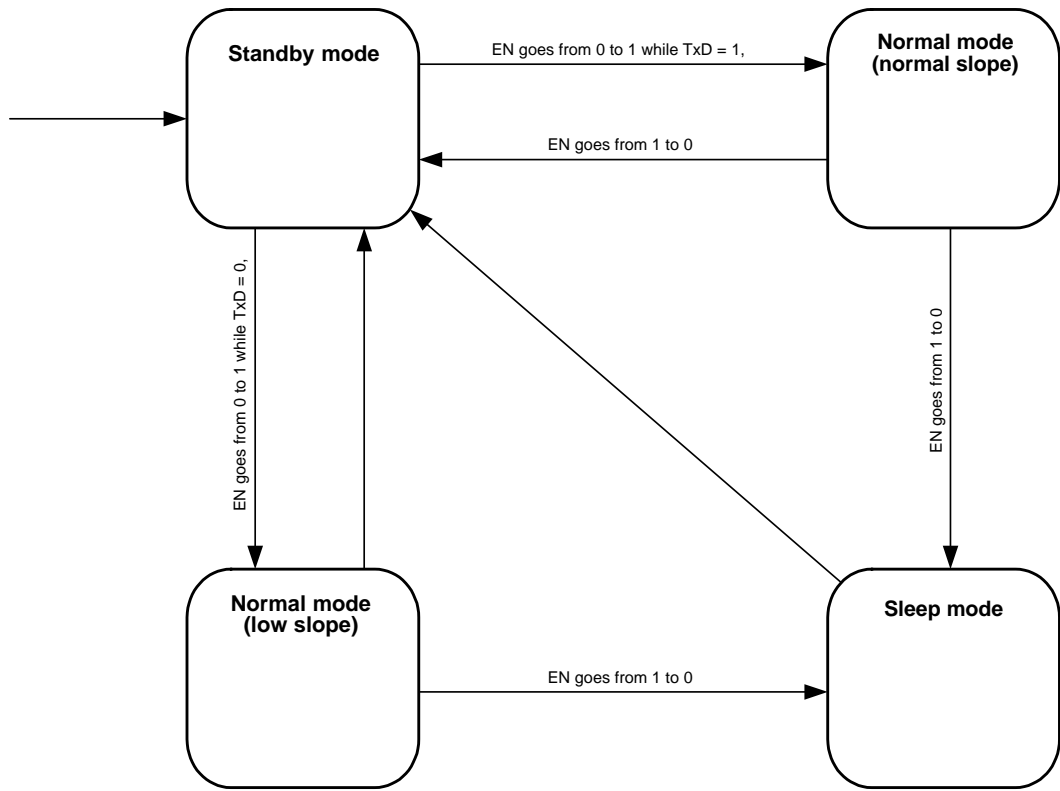


Figure 3. State Diagram

TxD=LOW), the LIN transmitter is enabled only after TxD returns to HIGH. If STB pin is high during the standby-to-low slope mode transition, INH pin is pulled high. Otherwise, it stays floating.

Standby Mode

The standby mode is always entered after power-up of the NCV7420. It can also be entered from normal mode when the EN pin is low and the standby pin is high. From sleep

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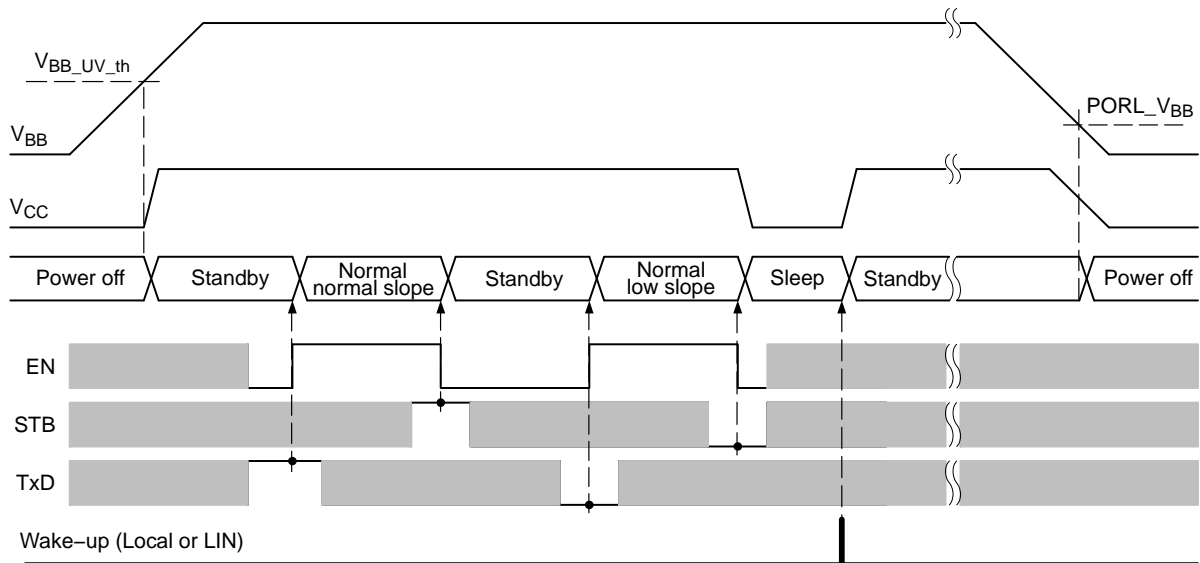


Figure 6. Operating Modes Transitions

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Electrical Characteristics

Definitions

All voltages are referenced to GND (Pin 11). Positive currents flow into the IC.

Table 6. ABSOLUTE MAXIMUM RATINGS – 3.3 V and 5 V versions

Symbol	Parameter	Min	Max	Unit
V_{BB}				
			+7	V
				mA
			+45	V
			+0.3	V

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Table 7. DC CHARACTERISTICS – 3.3 V version

($V_{BB} = 5\text{ V to }26\text{ V}$; $T_J = -40^\circ\text{C to }+150^\circ\text{C}$; Bus Load = $500\ \Omega$ (V_{BB} to LIN); unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
SUPPLY – Pin V_{BB}						
I_{BB_ON}	Supply current	Normal mode; LIN recessive			1.6	mA
I_{BB_STB}	Supply current	Standby mode, $V_{BB} =$				

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Table 7. DC CHARACTERISTICS – 3.3 V version

($V_{BB} = 5\text{ V}$ to 26 V ; $T_J = -40^\circ\text{C}$ to $+150^\circ\text{C}$; Bus Load = $500\ \Omega$ (V_{BB} to LIN); unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
LIN RECEIVER – Pin LIN						
$I_{LIN_no_VBB}$	LIN bus remains operational	$V_{BB} = GND = 0\text{ V}$; $0 < V_{LIN} < 18\text{ V}$			5	μA
Pin WAKE						
V_{WAKE_th}	Threshold voltage		0.35		0.65	V_{BB}
I_{LEAK}	Input leakage current (Note 18)	$V_{WAKE} = 0\text{ V}$; $V_{BB} = 18\text{ V}$	-1	-0.5	1	μA
t_{WAKE_MIN}	Debounce time	Sleep mode; risingNote 18)				

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Table 8. DC CHARACTERISTICS – 5 V version

($V_{BB} = 6\text{ V to }26\text{ V}$; $T_J = -40^\circ\text{C to }+150^\circ\text{C}$; Bus Load = $500\ \Omega$ (V_{BB} to LIN); unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
SUPPLY – Pin V_{BB}						
I_{BB_ON}	Supply current	Normal mode; LIN recessive			1.6	mA
I_{BB_STB}	Supply current	Standby mode, $V_{BB} = 6\text{--}18\text{ V}$, $T_J < 105^\circ\text{C}$			70	μA
I_{BB_SLP}	Supply current	Sleep mode, $V_{BB} = 6\text{--}18\text{ V}$, $T_J < 105^\circ\text{C}$			20	μA
VOLTAGE REGULATOR – Pin V_{CC}						
V_{CC_OUT}	Regulator output voltage	V_{CC} load 1 mA – 30 mA	4.9	5.0	5.1	V
		V_{CC} load 0 mA – 50 mA	4.83	5.0	5.17	
$I_{OUT_MAX_ABS}$	Absolute maximum output current	Thermal shutdown must be taken into account			50	mA
I_{OUT_LIM}	Overcurrent limitation		50	100	170	mA
ΔV_{CC_OUT}						

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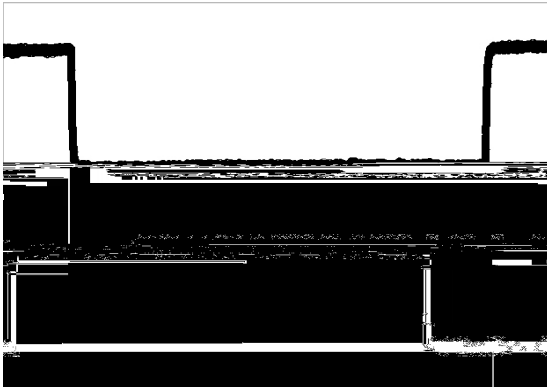
AC Characteristics – 3.3 V and 5 V versions – ($V_{BB} = 7\text{ V to }18\text{ V}$; $T_J = -40^\circ\text{C to }+150^\circ\text{C}$; unless otherwise specified.)

Table 9. AC CHARACTERISTICS LIN TRANSMITTER – Pin LIN

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
D1	Duty Cycle 1 = $t_{BUS_REC(min)} / (2 \times t_{BIT})$ see Figure 23	Normal slope mode $TH_{REC(max)} = 0.744 \times V_{BB}$ $TH_{DOM(max)} = 0.581 \times V_{BB}$ $t_{BIT} = 50\ \mu\text{s}$ $V_{BB} = 7\text{ V to }18\text{ V}$	0.396		0.5	
D2	Duty Cycle 2 = $t_{BUS_REC(max)} / (2 \times t_{BIT})$ see Figure 23	Normal slope mode $TH_{REC(min)} = 0.422 \times V_{BB}$ $TH_{DOM(min)} = 0.284 \times V_{BB}$ $t_{BIT} = 50\ \mu\text{s}$ $V_{BB} = 7.6\text{ V to }18\text{ V}$	0.5		0.581	
D3	Duty Cycle 3 = $t_{BUS_REC(min)} / (2 \times t_{BIT})$					

REGULATOR TYPICAL PERFORMANCE CHARACTERISTICS – 3.3 V VERSION

Load Transient Responses



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REGULATOR TYPICAL PERFORMANCE CHARACTERISTICS – 3.3 V VERSION

Static Characteristics

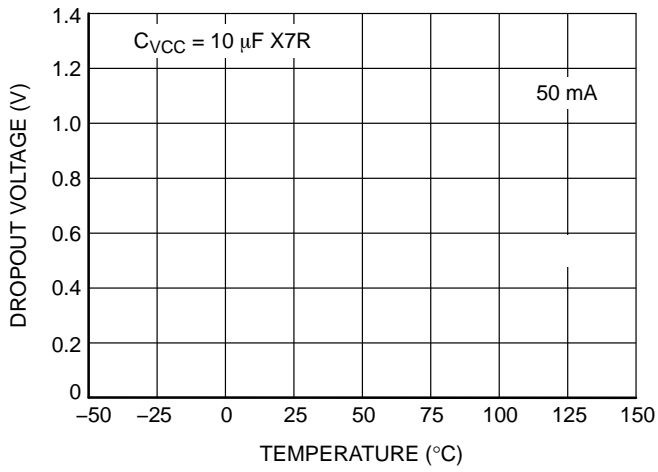


Figure 11. Dropout Voltage vs. Temperature

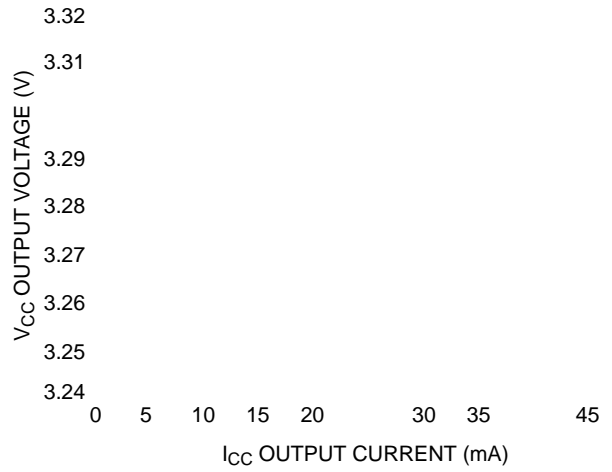


Figure 12. Output Voltage vs. Output Current

REGULATOR TYPICAL PERFORMANCE CHARACTERISTICS – 5 V VERSION

Load Transient Responses

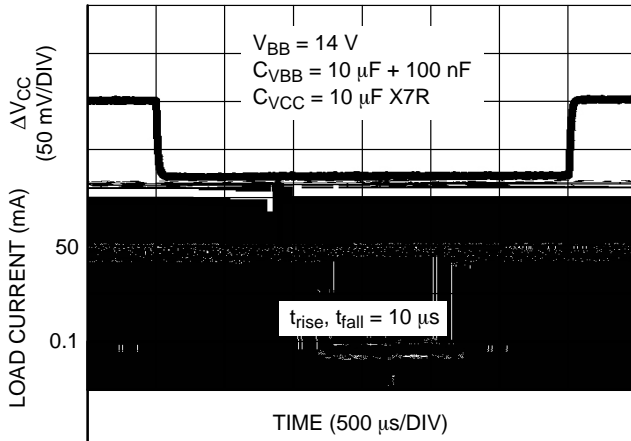


Figure 15. Load Transient Response (I_{CC} 100 μA to 50 mA)

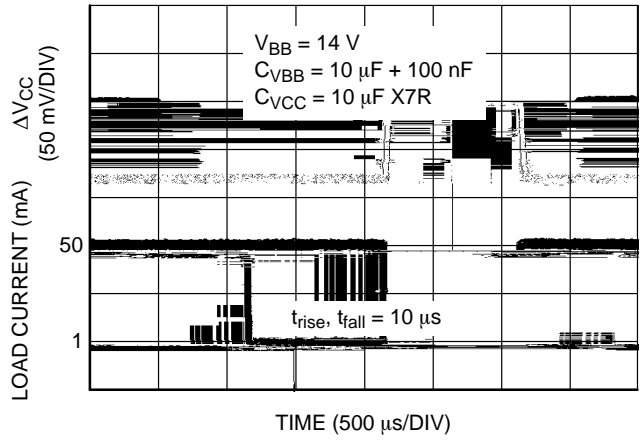


Figure 16. Load Transient Response (I_{CC} 1 mA to 50 mA)

Line Transient Responses

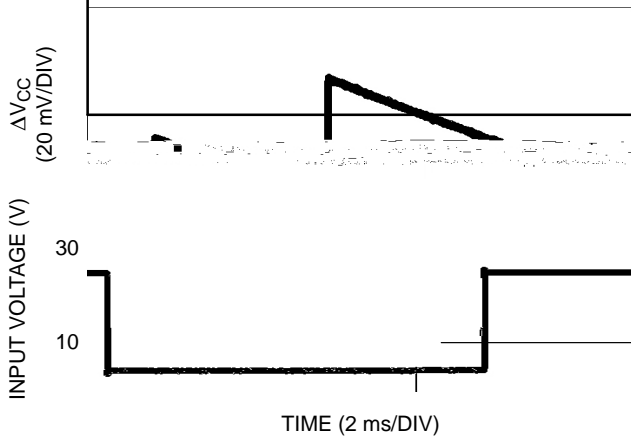


Figure 17. Line Transient Response (V_{BB} 6 V to 26 V)

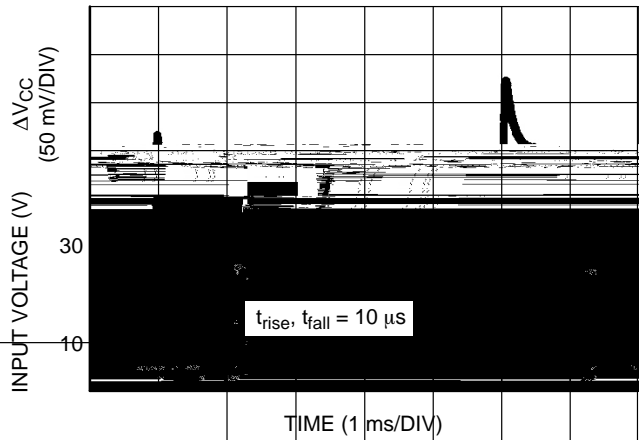


Figure 18. Line Transient Response (V_{BB} 6 V to 26 V)

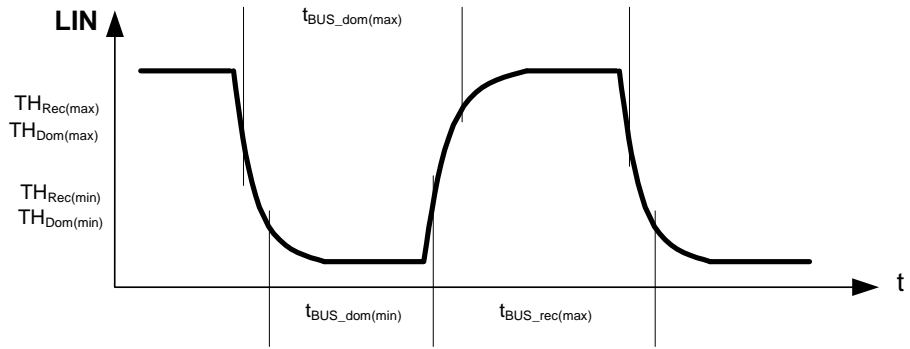


Table 10. AC CHARACTERISTICS LIN RECEIVER

Symbol Pin LIN	Parameter	Conditions	Min	Typ	Max	Unit
$t_{rec_prop_down}$	Propagation delay of receiver falling edge		0.1		6	μs
$t_{rec_prop_up}$	Propagation delay of receiver rising edge		0.1		6	μs
t_{rec_sym}	Propagation delay symmetry	$t_{rec_prop_down} - t_{rec_prop_up}$	-2		2	μs

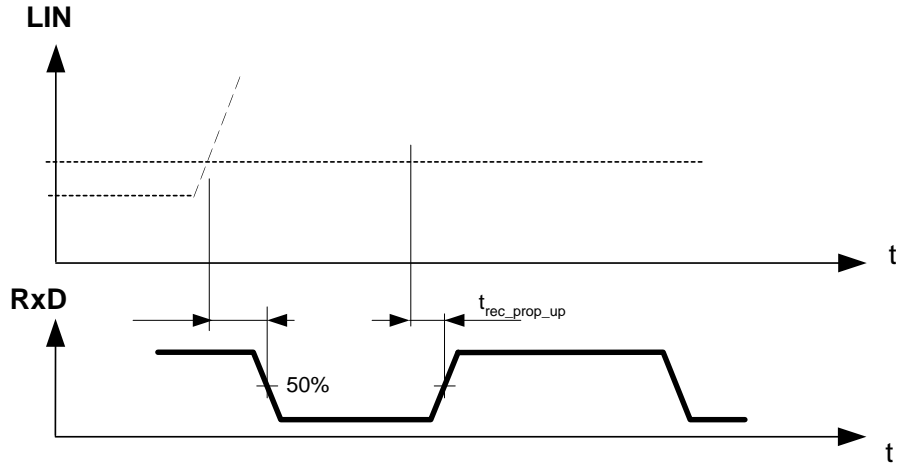
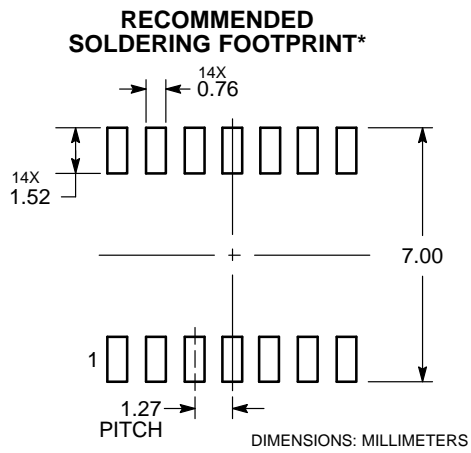


Figure 26. LIN Receiver Timing



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*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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