NCV7420

LIN Transceiver with 3.3 V or 5 V Voltage Regulator

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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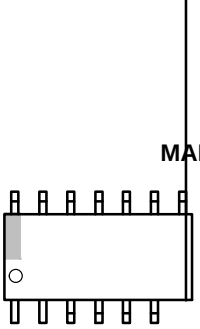
MARKING DIAGRAM



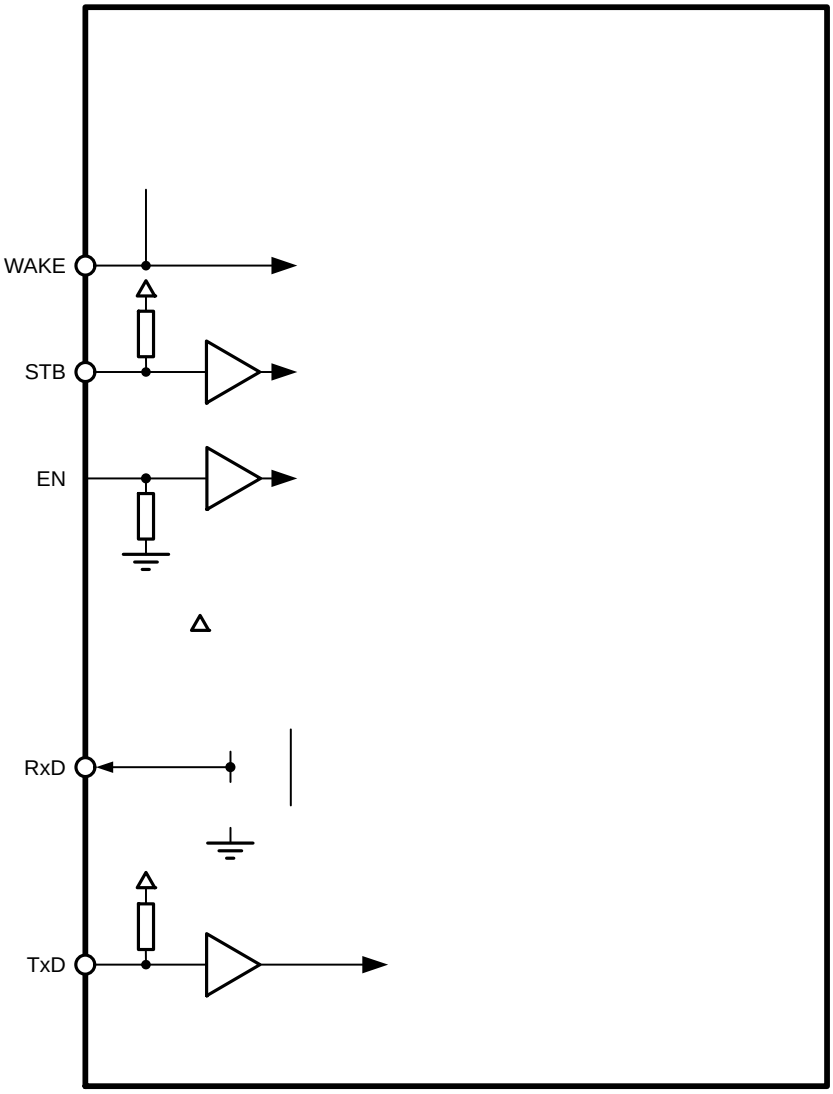


Figure 1. Block Diagram

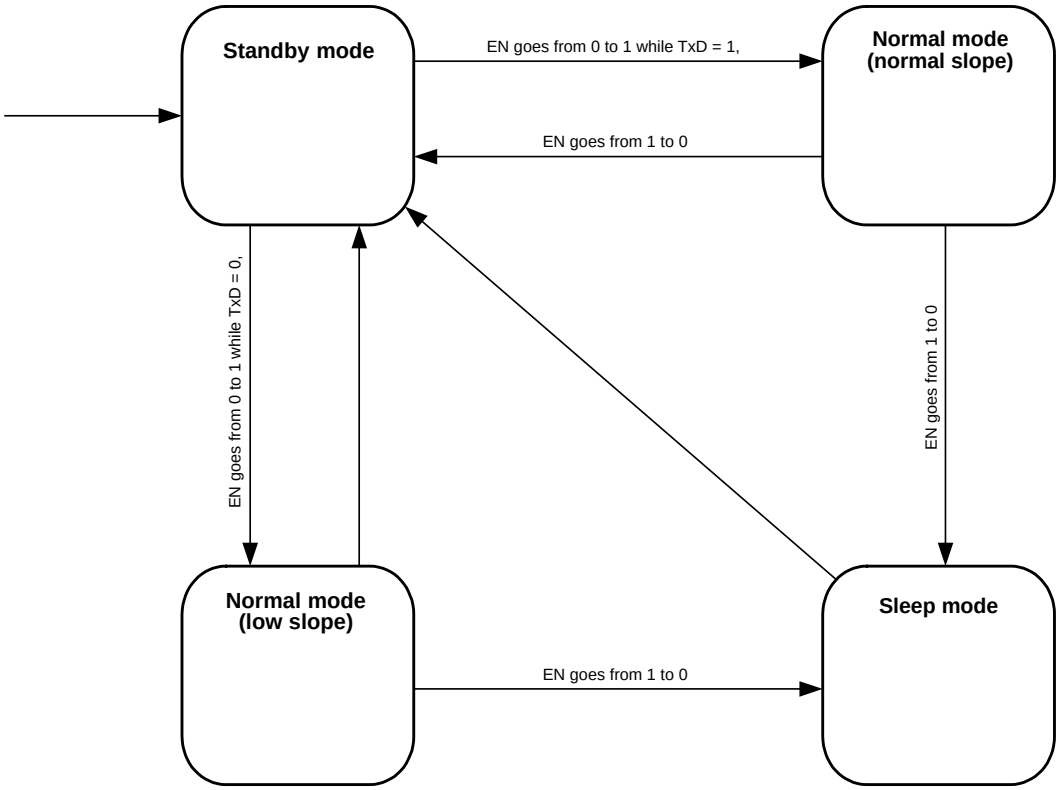


Figure 3. State Diagram

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

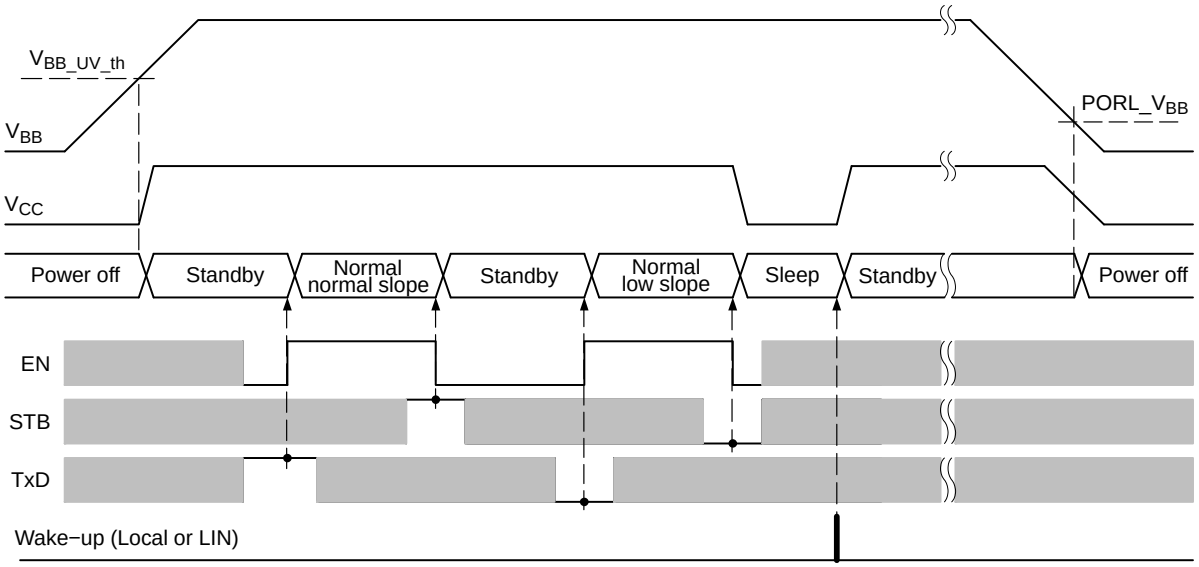


Figure 6. Operating Modes Transitions

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}	[redacted]			
			+7	V
				mA
			+45	V
			+ 0.3	V

Table 7. DC CHARACTERISTICS – 3.3 V version
(V_{BB} = 5 V to 26 V; T_J = −40°C to +150°C; Bus Load = 500 Ω (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} =				

Table 7. DC CHARACTERISTICS – 3.3 V version
(V_{BB} = 5 V to 26 V; T_J = −40°C to +150°C; Bus Load = 500 Ω (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 V; 0 < V_{LIN} < 18 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 V; V_{BB} = 18 V	−1	−0.5	1	μA
t_{WAKE_MIN}	Debounce time	Sleep mode; risingNote 18)				

Table 8. DC CHARACTERISTICS – 5 V version
(V_{BB} = 6 V to 26 V; T_J = −40°C to +150°C; Bus Load = 500 Ω (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} = 6–18 V, T_J < 105°C			70	μA
I_{BB_SLP}	Supply current	Sleep mode, V_{BB} = 6–18 V, T_J < 105°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}						

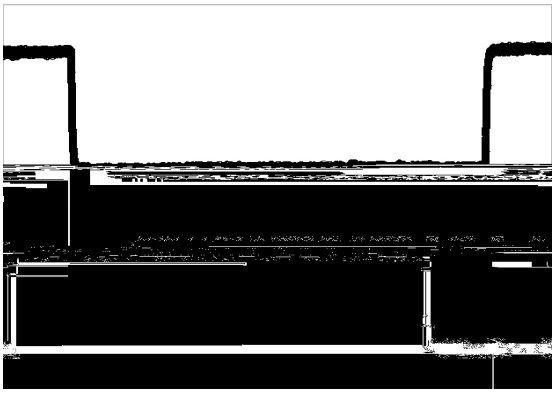
AC Characteristics – 3.3 V and 5 V versions – (V_{BB} = 7 V to 18 V; T_J = −40°C to +150°C; unless otherwise specified.)

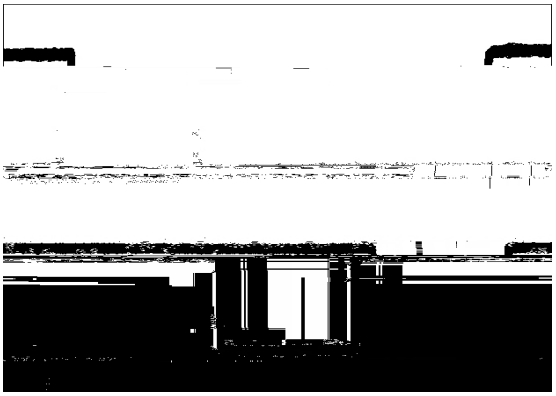
Table 9. AC CHARACTERISTICS LIN TRANSMITTER − Pin LIN

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

REGULATOR TYPICAL PERFORMANCE CHARACTERISTICS − 3.3 V VERSION

Load Transient Responses





REGULATOR TYPICAL PERFORMANCE CHARACTERISTICS − 3.3 V VERSION

Static Characteristics

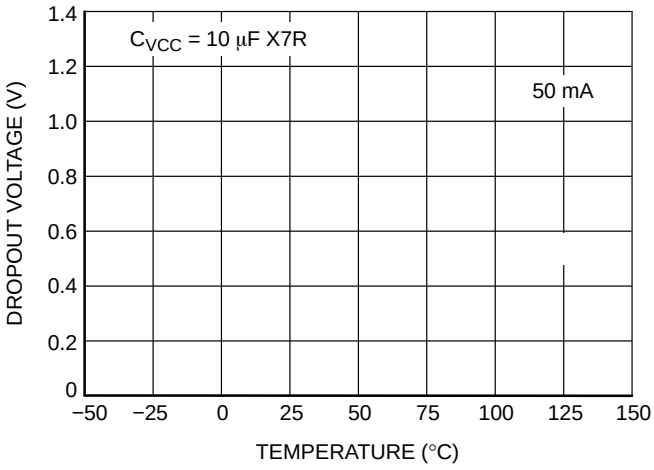


Figure 11. Dropout Voltage vs. Temperature

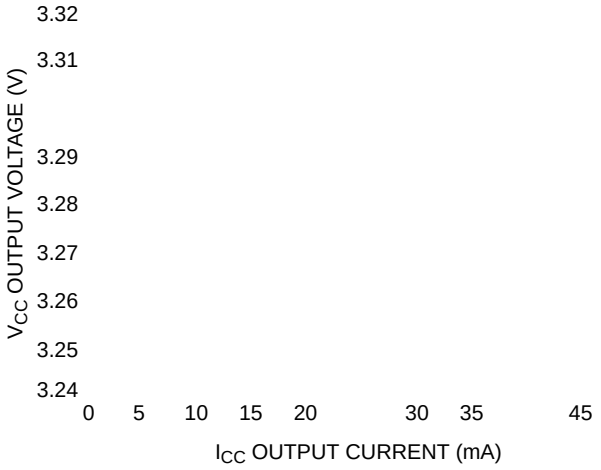


Figure 12. Output Voltage vs. Output Current

REGULATOR TYPICAL PERFORMANCE CHARACTERISTICS − 5 V VERSION

Load Transient Responses

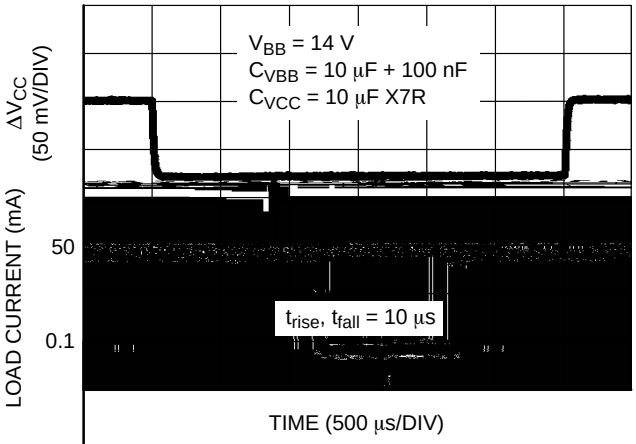


Figure 15. Load Transient Response (I_{CC} 100 μA to 50 mA)

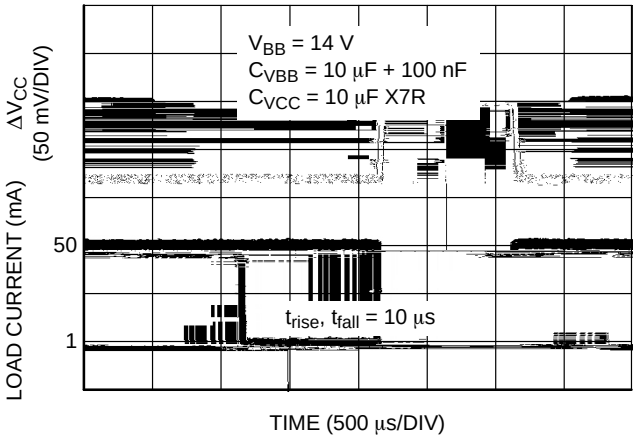


Figure 16. Load Transient Response (I_{CC} 1 mA to 50 mA)

Line Transient Responses

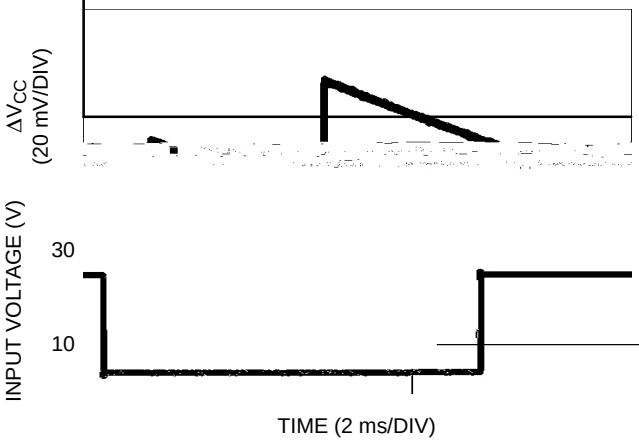


Figure 17. Line Transient Response (V_{BB} 6 V to 26 V)

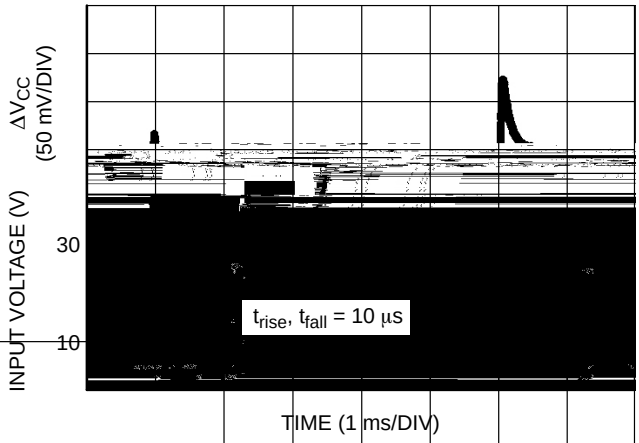


Figure 18. Line Transient Response (V_{BB} 6 V to 26 V)

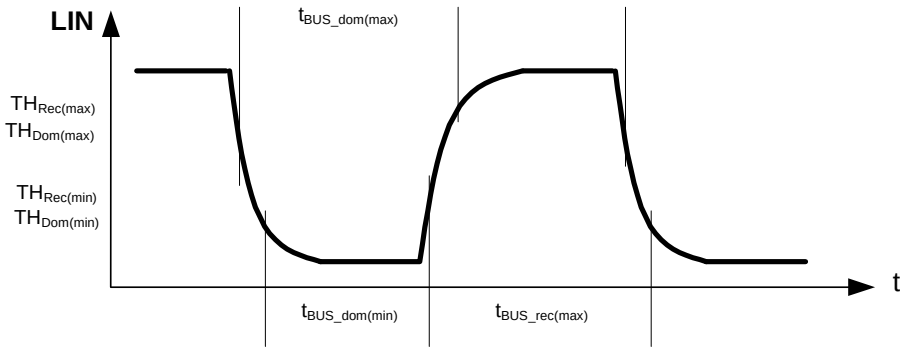

LIN
$t_{BUS\_dom(max)}$
$TH_{Rec(max)}$
$TH_{Dom(max)}$
$TH_{Rec(min)}$
$TH_{Dom(min)}$
t
$t_{BUS\_dom(min)}$
$t_{BUS\_rec(max)}$

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

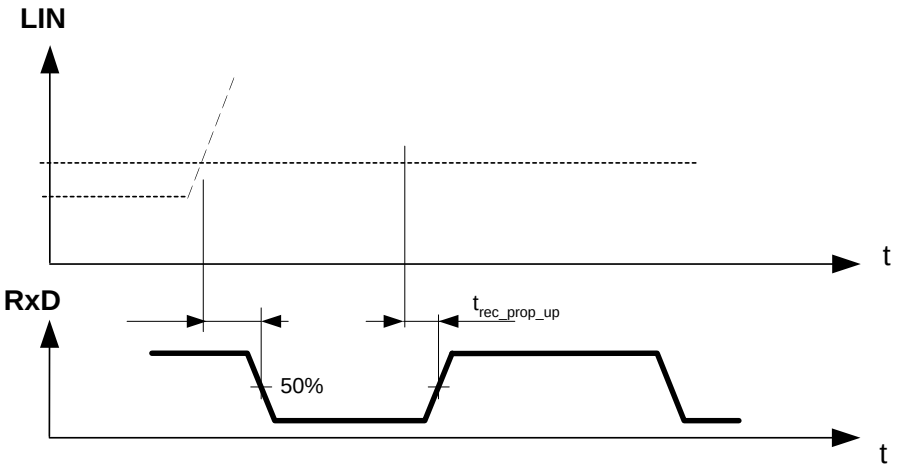
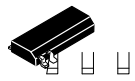
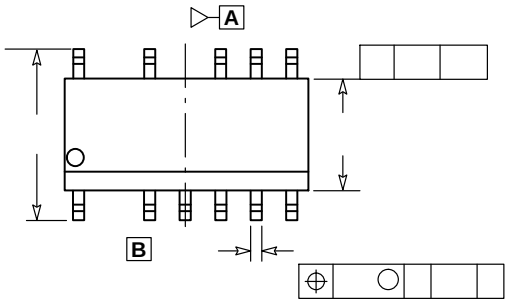
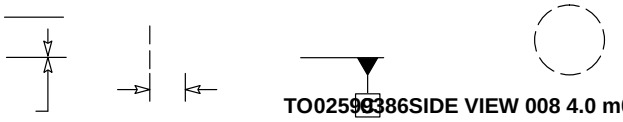


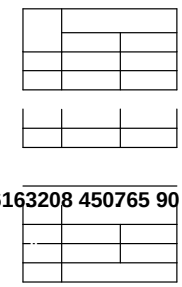
Figure 26. LIN Receiver Timing

SOIC−14



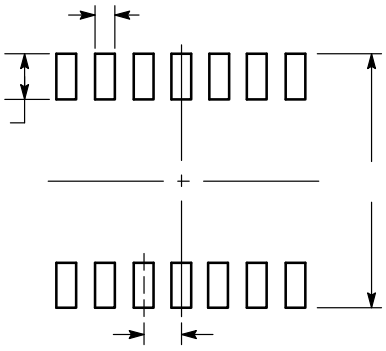






TO02590386SIDE VIEW 008 4.0 m0 [5 1e153184 624 6163208 450765 90 105563 5483 cm0 105563 5483 cm0 6 390954

RECOMMENDED
SOLDERING FOOTPRINT*



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