

TL16C550C, TL16C550CI ASYNCHRONOUS COMMUNICATIONS ELEMENT WITH AUTOFLOW CONTROL

SLLS177G – MARCH 1994 – REVISED NOVEMBER 2002

- Programmable Auto- $\overline{\text{RTS}}$ and Auto- $\overline{\text{CTS}}$
- In Auto- $\overline{\text{CTS}}$ Mode, $\overline{\text{CTS}}$ Controls Transmitter
- In Auto- $\overline{\text{RTS}}$ Mode, RCV FIFO Contents and Threshold Control $\overline{\text{RTS}}$
- Serial and Modem Control Outputs Drive a RJ11 Cable Directly When Equipment Is on the Same Power Drop
- Capable of Running With All Existing TL16C450 Software
- After Reset, All Registers Are Identical to the TL16C450 Register Set
- Up to 16-MHz Clock Rate for up to 1-Mbaud Operation
- In the TL16C450 Mode, Hold and Shift Registers Eliminate the Need for Precise Synchronization Between the CPU and Serial Data
- Programmable Baud Rate Generator Allows Division of Any Input Reference Clock by 1 to $(2^{16} - 1)$ and Generates an Internal $16\times$ Clock
- Standard Asynchronous Communication Bits (Start, Stop, and Parity) Added to or Deleted From the Serial Data Stream
- 5-V and 3.3-V Operation
- Independent Receiver Clock Input
- Transmit, Receive, Line Status, and Data Set Interrupts Independently Controlled
- Fully Programmable Serial Interface Characteristics:
 - 5-, 6-, 7-, or 8-Bit Characters
 - Even-, Odd-, or No-Parity Bit Generation and Detection
 - 1-, 1 1/2-, or 2-Stop Bit Generation
 - Baud Generation (dc to 1 Mbit/s)
- False-Start Bit Detection
- Complete Status Reporting Capabilities
- 3-State Output TTL Drive Capabilities for Bidirectional Data Bus and Control Bus
- Line Break Generation and Detection
- Internal Diagnostic Capabilities:
 - Loopback Controls for Communications Link Fault Isolation
 - Break, Parity, Overrun, and Framing Error Simulation
- Fully Prioritized Interrupt System Controls
- Modem Control Functions ($\overline{\text{CTS}}$, $\overline{\text{RTS}}$, $\overline{\text{DSR}}$, $\overline{\text{DTR}}$, $\overline{\text{RI}}$, and $\overline{\text{DCD}}$)

description

The TL16C550C and the TL16C550CI are functional upgrades of the TL16C550B asynchronous communications element (ACE), which in turn is a functional upgrade of the TL16C450. Functionally equivalent to the TL16C450 on power up (character or TL16C450 mode), the TL16C550C and the TL16C550CI, like the TL16C550B, can be placed in an alternate FIFO mode. This relieves the CPU of excessive software overhead by buffering received and transmitted characters. The receiver and transmitter FIFOs store up to 16 bytes including three additional bits of error status per byte for the receiver FIFO. In the FIFO mode, there is a selectable autoflow control feature that can significantly reduce software overload and increase system efficiency by automatically controlling serial data flow using $\overline{\text{RTS}}$ output and $\overline{\text{CTS}}$ input signals.

The TL16C550C and TL16C550CI perform serial-to-parallel conversions on data received from a peripheral device or modem and parallel-to-serial conversion on data received from its CPU. The CPU can read the ACE status at any time. The ACE includes complete modem control capability and a processor interrupt system that can be tailored to minimize software management of the communications link.

Both the TL16C550C and the TL16C550CI ACE include a programmable baud rate generator capable of dividing a reference clock by divisors from 1 to 65535 and producing a $16\times$ reference clock for the internal transmitter logic. Provisions are included to use this $16\times$ clock for the receiver logic. The ACE accommodates a 1-Mbaud serial rate (16-MHz input clock) so that a bit time is 1 μs and a typical character time is 10 μs (start bit, 8 data bits, stop bit).

Two of the TL16C450 terminal functions on the TL16C550C and the TL16C550CI have been changed to $\overline{\text{TXRDY}}$ and $\overline{\text{RXRDY}}$, which provide signaling to a DMA controller.



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS
INSTRUMENTS**

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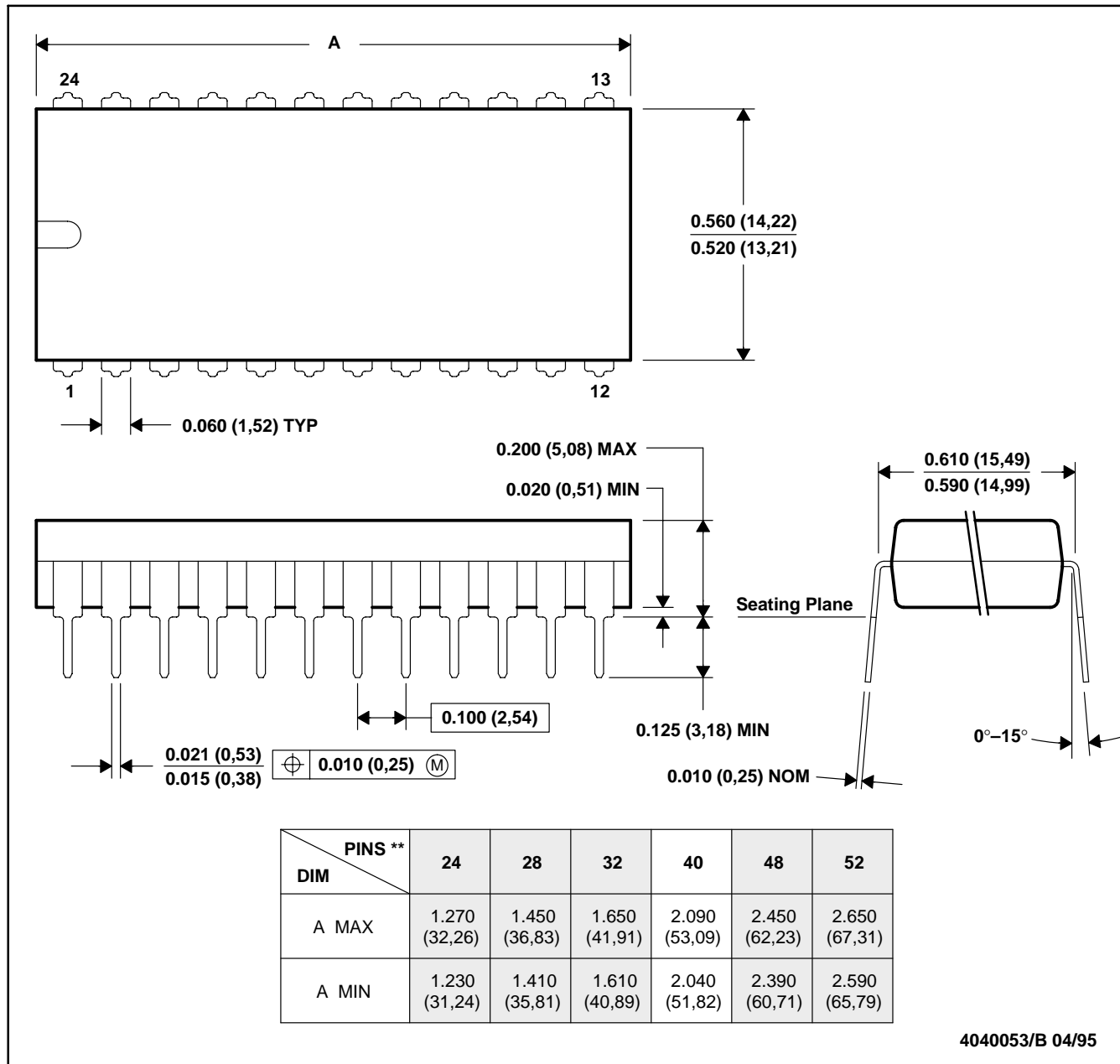
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MECHANICAL DATA

N (R-PDIP-T)**

PLASTIC DUAL-IN-LINE PACKAGE

24 PIN SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Falls within JEDEC MS-011
 D. Falls within JEDEC MS-015 (32 pin only)

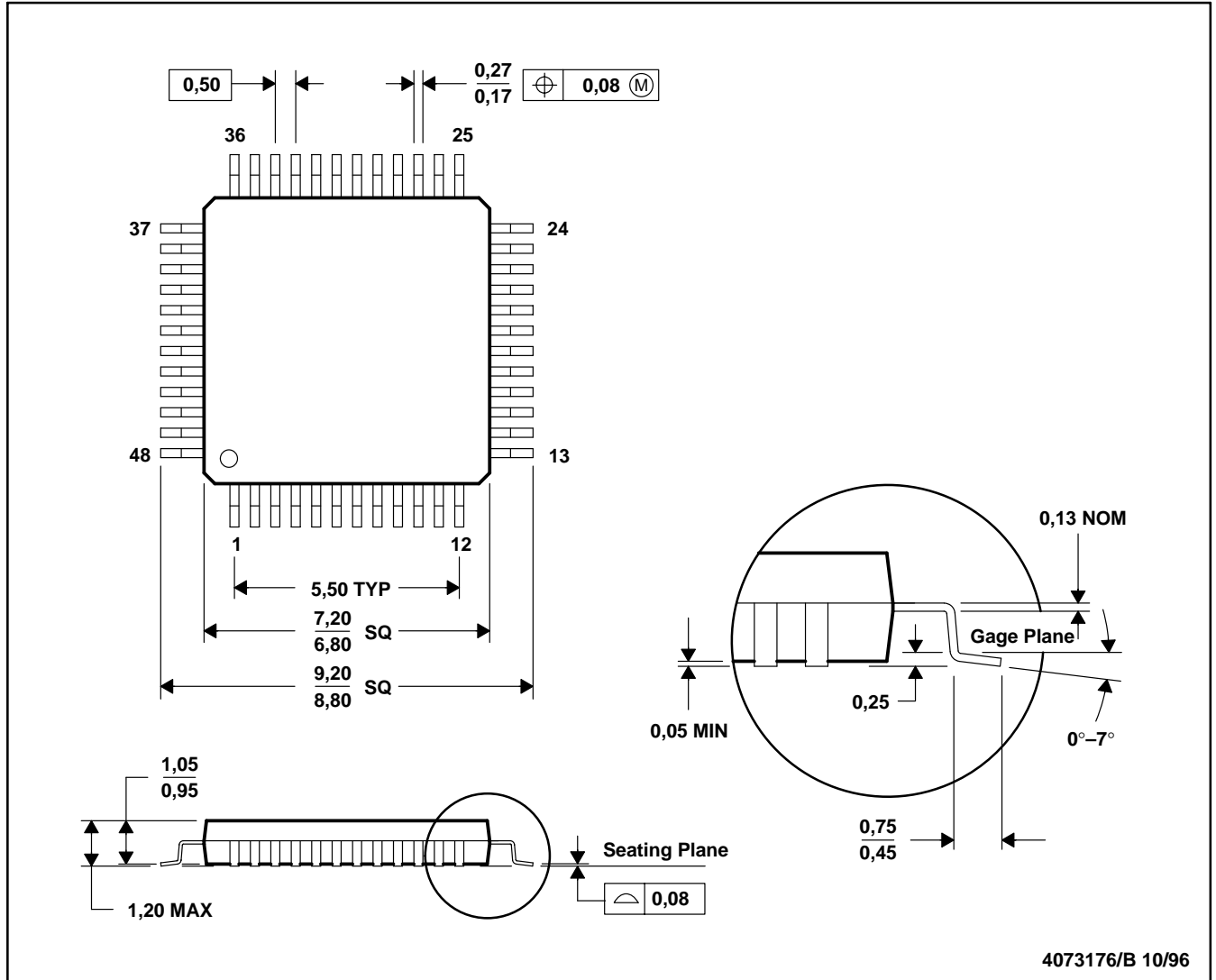
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MECHANICAL DATA

PFB (S-PQFP-G48)

PLASTIC QUAD FLATPACK



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Falls within JEDEC MS-026

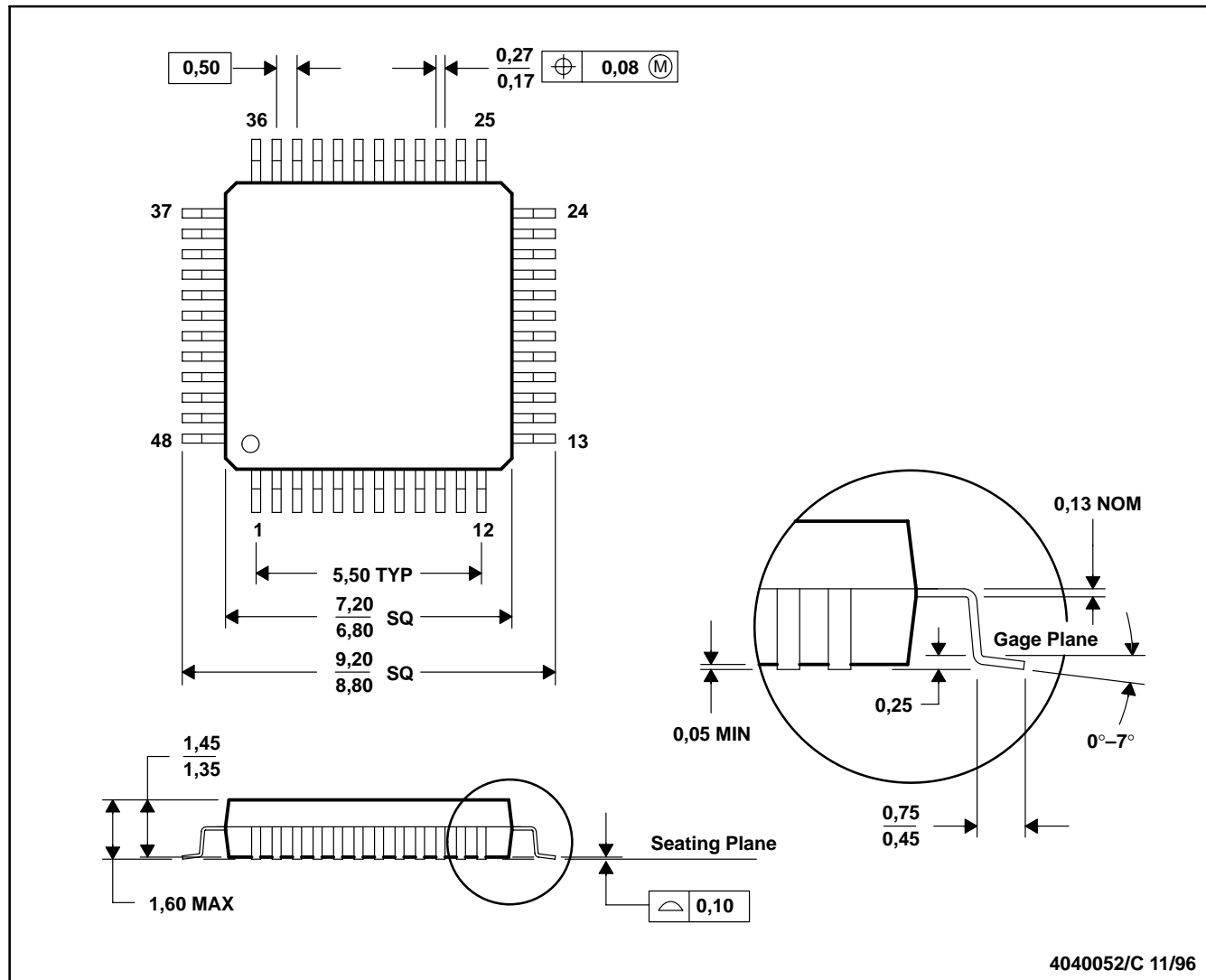
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MECHANICAL DATA

PT (S-PQFP-G48)

PLASTIC QUAD FLATPACK



- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Falls within JEDEC MS-026
 D. This may also be a thermally enhanced plastic package with leads connected to the die pads.

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
TL16C550CFN	ACTIVE	PLCC	FN	44	26	TBD	Call TI	Level-3-220C-168 HR
TL16C550CFNR	ACTIVE	PLCC	FN	44	500	TBD	Call TI	Level-3-220C-168 HR
TL16C550CIFN	ACTIVE	PLCC	FN	44	26	TBD	Call TI	Level-3-220C-168 HR
TL16C550CIPT	ACTIVE	LQFP	PT	48	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR
TL16C550CIPTG4	ACTIVE	LQFP	PT	48	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR
TL16C550CIPTR	ACTIVE	LQFP	PT	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR
TL16C550CIPTRG4	ACTIVE	LQFP	PT	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR
TL16C550CN	ACTIVE	PDIP	N	40	9	TBD	CU	Level-NA-NA-NA
TL16C550CPFB	ACTIVE	TQFP	PFB	48	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
TL16C550CPFBR	ACTIVE	TQFP	PFB	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
TL16C550CPT	ACTIVE	LQFP	PT	48	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR
TL16C550CPTG4	ACTIVE	LQFP	PT	48	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR
TL16C550CPTR	ACTIVE	LQFP	PT	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR
TL16C550CPTRG4	ACTIVE	LQFP	PT	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

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OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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