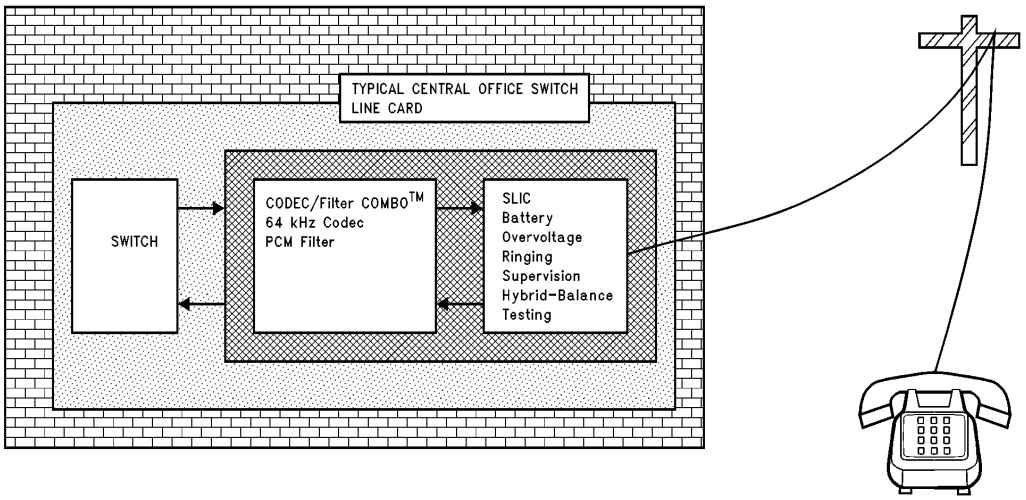
Subscriber Line Card for Central Office Telephone Switching Equipment

National Semiconductor
System Brief 100
May 1990



TL/F/10850–1

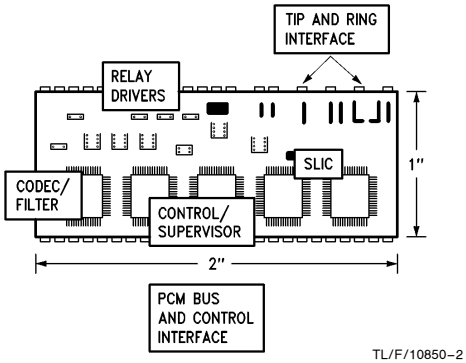
SYSTEM DESCRIPTION

Subscriber linecards are designed to interface the analog subscriber line to a PCM highway in a Digital Central Office or a Digital Loop Carrier (DLC) channel bank or remote concentrator systems. Subscriber Line Interface Module (SLIM™) devices are complete Electronic Subscriber Line Interface Circuit (SLIC) and PCM COMBO® CODEC/Filter systems, designed to meet the requirements for POTS (Plain Old Telephone Service) lines for Central Office or DLC subscriber line cards. When used in conjunction with a simple, non-critical, external protection network, two feed resistors, and a ring relay, the SLIM forms a complete line circuit handling all of the BORSCHT functions.

The SLIM consists of a line driver, a line receiver, a line impedance control circuit, a hybrid balance circuit, a loop supervision circuit, a ring supervision circuit, three positive relay drivers, a TP3054 COMBO CODEC/Filter, and a serial control interface.

The SLIM is assembled in a 1″ by 2″ Dual-In-Line Package, which allows very high density line cards with many lines per card and typically can reduce the card to card spacing within a switch rack or frame.

SLIM-Subscriber Line Interface Module



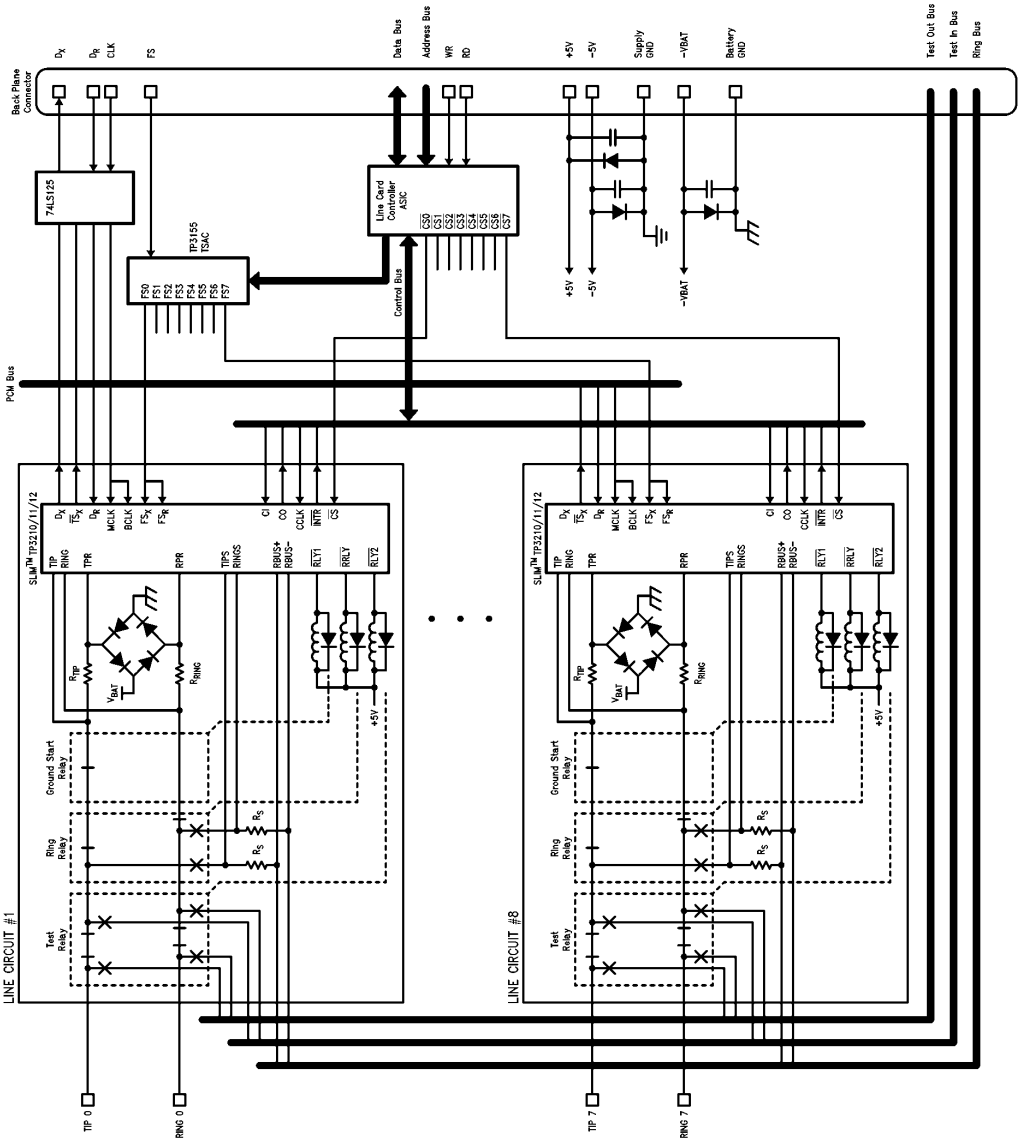
TL/F/10850–2

COMBO® is a registered trademark of National Semiconductor Corporation.
SLIM™ is a trademark of National Semiconductor Corporation.

 TL/F/10850

RRD-B30M105/Printed in U. S. A.

Typical 8-Line Line Card Using the National Semiconductor SLIM



TL/F/10850–3

KEY DESIGN CHALLENGES

Meeting All Bellcore/REA/CCITT Specifications

Designing a Subscriber Line circuit which meets all of the Bellcore/REA/CCITT specifications not only requires tremendous awareness of the specifications, but when understood, can be extremely difficult to meet from a hardware point of view. Discrete solutions typically used require the precise evaluation of each component and careful system planning and design to insure compliance to all of the Bellcore/REA/CCITT specifications. The SLIM, being a complete line circuit system in a single package which is designed by National Semiconductor to meet the specifications, minimizes the demands on the designer and the technical risk associated with discrete multi-component approaches.

Meeting System Cost Requirements

The Switching System Equipment market is highly competitive and therefore the demands on the designer to use the least cost approach is ever dominant. The SLIM is competitive with all other modern alternatives, and due to its highly integrated system level approach, it minimizes the component incoming test, linecard assembly and yield loss factors, thereby reducing total cost of ownership for the linecard solution.

Time to Market

Typical turn around time from design start through field trials and production release can be very lengthy and therefore is dangerous in terms of keeping a competitive edge or staying competitive. The SLIM, being a complete line circuit ''system'' in a single package, reduces the engineering design time to system and line card evaluation time, thus significantly decreasing the time to market.

KEY FEATURES OF THE TP3210, TP3211, TP3212 SLIM SUBSCRIBER LINE INTERFACE MODULE

- Complete CODEC/Filter and SLIC functions plus protection
- Requires only simple protection network and 4 resistors externally
- Very small 1″ by 2″ package supports high density line card and system
- Superb power surge and lightning protection
- Withstands 500V Return to Ground surge
- Power Denial mode
- Thermal overload protection
- Automatic Ring Trip
- Four Selectable Balance Networks
- Three positive relay drivers
- TP3210 SLIM meets all Bellcore and REA specifications for USA Central Office
- TP3211 SLIM meets all CCITT requirements for 600Ω Central Office applications
- TP3212 meets TR-TSY-00057 specification for DLC POTS lines

Typical Bill of Material for an 8-Channel SLIM Based Line Card

Function	Description	NSC Part	Other Mfg	Qty
SLIC + CODEC/Filter	SLIM	TP3210/11/12		8
Line Circuit Protection	Diode Bridge			8
	Fusistors	2 x 100Ω, ±3%		8
Ring Feed	Resistors	2 x 360Ω, ±3%		8
Relays	Ring Relay		DS-2E-5VDC	8
	Test Relay		DS-4E-5VDC	8
	Ground Start Relay (Note 1)		DS-2E-5VDC	8
Relay Catch Diodes			1N4001	24
Time Slot Assigner	TSAC	TP3155		1
Line Card Controller		ASIC (Note 2)		1
Buffer		74LS125		1
Supplies	Schottky Diodes		1N5820	2
Filter and Protection			1N6290A	1
	Tantalum Capacitors		47 μF, 25V	2
	Electrolytic Capacitor		47 μF, 63V	1

Note 1: Ground Start Relay is Optional depending on application.

Note 2: Line Card Controller ASIC is dependent on backplane structure.

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

National Semiconductor Corporation
1111 West Bardin Road
Arlington, TX 76017
Tel: 1(800) 272-9959
Fax: 1(800) 737-7018

National Semiconductor Europe
Fax: (+49) 0-180-530 85 86
Email: cnjwge@tevm2.nsc.com
Deutsch Tel: (+49) 0-180-530 85 85
English Tel: (+49) 0-180-532 78 32
Français Tel: (+49) 0-180-532 93 58
Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
Tel: 81-043-299-2309
Fax: 81-043-299-2408