

LB1201

Subscriber Line Interface Circuit (SLIC) Protector

Features

- Shunts lightning pulses to ground
 - Positive or negative 12.5 A, 10 μ s x 1000 μ s
 - Positive or negative 18.5 A, 10 μ s x 160 μ s
- Only small supply current (≤ 700 mA, worst case) required during surge condition
- Power-cross protection
 - 1 Arms, 60 Hz, 2 s, guaranteed capability
 - 6 Arms, 60 Hz, 25 ms, guaranteed capability
- Up to -83 V capability
- Typically less than 20 μ W power consumption in quiescent state

Description

The LB1201 Subscriber Line Interface Circuit (SLIC) Protector is designed to protect line-feed circuitry from fault-induced lightning and power-cross surge pulses. If a fault current forces TIP and/or RING to a more negative voltage than V_s , current is conducted through the trip circuit. When the specified trip current level is reached, transistors PNP1 and/or PNP2 will turn on and "crowbar" the majority of the current to ground. If similar pulses force TIP and/or RING to a more positive state than ground, diodes D1 and/or D2 will conduct the pulse to ground.

The SLIC Protector is available in an 8-pin, plastic DIP (LB1201AB) and in an 8-pin SONB (LB1201AS).

Pin Information

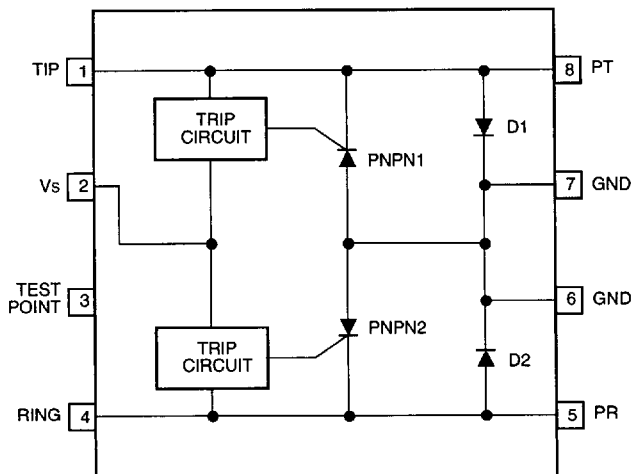


Figure 1. Functional and Pin Diagram

Pin Information (Continued)**Table 1. Pin Descriptions**

Pin	Symbol	Name/Function
1	TIP	TIP. TIP signal from customer.
2	Vs	Supply Voltage (-20 V to -80 V).
3	Test Point	Test Point. (Internally connected.) Do not use as a tie point for external circuitry.
4	RING	RING. RING signal from customer.
5	PR	Protected RING. Protected RING signal to line-feed circuitry.
6	GND	Ground. Device ground/fault current return.
7	GND	Ground. Device ground/fault current return.
8	PT	Protected TIP. Protected TIP signal to line-feed circuitry.

Note: Pins 1 and 4 must always be connected to the protection resistors shown in the application Figures 8 and 9 (line feed circuitry).
The SLIC can be connected either to the protected outputs (pins 5 and 8) or to the inputs (pins 1 and 4).

Absolute Maximum Ratings (At 25 °C)

Stresses in excess of the Absolute Maximum Ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to Absolute Maximum Ratings for extended periods of time can adversely affect device reliability.

Parameter	Symbol	Min	Typ	Max	Unit
Ambient Operating Temperature	T _A	-40	—	+85	°C
Storage Temperature Range	T _{stg}	-40	—	+125	°C
Pin Soldering Temperature (t = 15 s max)	T _s	—	300	—	°C
Supply Voltage	V _{ss}	—	-83	—	V

Electrical Characteristics

Unless otherwise indicated, $-40\text{ }^{\circ}\text{C} \leq T_A \leq +85\text{ }^{\circ}\text{C}$.

The minimum and/or maximum limits specified for the parameters are based on the absolute system. The algebraic sign only applies to the direction of the parameter. These requirements apply to either the TIP or RING terminal; however, the device is capable of simultaneous TIP and RING surges and continuous current, as noted below in TIP and RING leads.

Parameter	Test Conditions	Min	Typ	Max	Unit
IP Pulse Current:*					
Lightning	2 x 10 μs (See Figure 2.)	± 23.0	± 40	—	A
Lightning	10 x 1000 μs (See Figure 2.)	± 12.5	+18/-22	—	A
Lightning	10 x 160 μs (See Figure 2.)	± 18.5	+23/-31	—	A
60 Hz Sinewave	2 s (See Figure 3.)	1	4.9	—	Arms
60 Hz Sinewave	25 ms (See Figure 3.)	6	7.3	—	Arms
VF Forward Voltage (diode on)	IP = 12.5 A pulsed (See Figures 2, 8.)	—	3.5	4.5	V
VON On-state Voltage	IP = -12.5 A pulsed (See Figures 2, 8.)	—	-3.0	-4.5	V
IT Trip Current	@ 25 $^{\circ}\text{C}$, VS = -48 V (See Figures 4, 8.)	IT > IH	-250	-275	mA
100 ms Pulse	@ 40 $^{\circ}\text{C}$, VS = -48 V (See Figures 4, 8.)	IT > IH	-310	-350	mA
	@ 85 $^{\circ}\text{C}$, VS = -48 V (See Figures 4, 8.)	IT > IH	-200	-275	mA
60 Hz Continuous	VS = -53 V	17	—	—	mArms
VT Trip Voltage	dc	VS - 1	VS - 3	VS - 5	V
12.5 A Peak, 10 x 1000 μs	Lightning surge, -20 V > VS > -80 V	VS - 4	VS - 7	VS - 10	V
Ih Hold Current	@ 25 $^{\circ}\text{C}$ (See Figures 5, 8.)	-125	-180	Ih < It	mA
	@ -40 $^{\circ}\text{C}$ (See Figures 5, 8.)	-125	-225	Ih < It	mA
	@ 85 $^{\circ}\text{C}$ (See Figures 5, 8.)	-100	-155	Ih < It	mA
Io Off-state Current (at 25 $^{\circ}\text{C}$)	TIP, RING @ VS = -83 V (See Figure 6.)	—	0.1	1	A
	TIP, RING @ GND (See Figure 6.)	—	0.1	1	A
COFF Off-state Capacitance	TIP, RING @ VS = 83 V	—	51	250	pF
	TIP, RING @ GND	—	56	250	pF
dV/dt Sensitivity	TIP or RING lead	± 100	—	—	V/ μs
Ic On-state Current Per Lead	Continuous dc current (See Figure 7.)	± 300	± 700	—	mA

* Device pins 6 and 7 must be connected to GND for full protection. The device is guaranteed to withstand the minimum pulsed current shown without failure. The typical values shown are the current at which an average part will fail.

Test Circuits

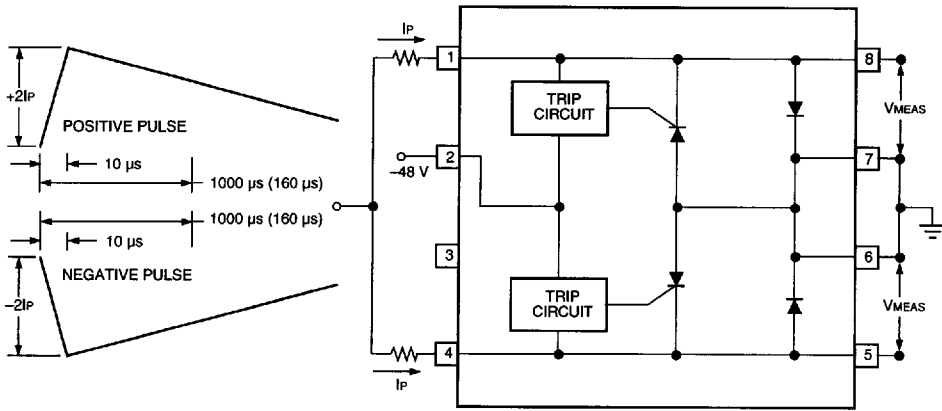


Figure 2. Test Circuit 1

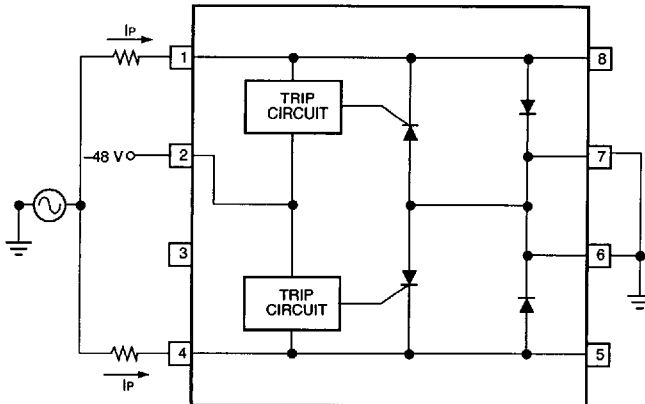


Figure 3. Test Circuit 2

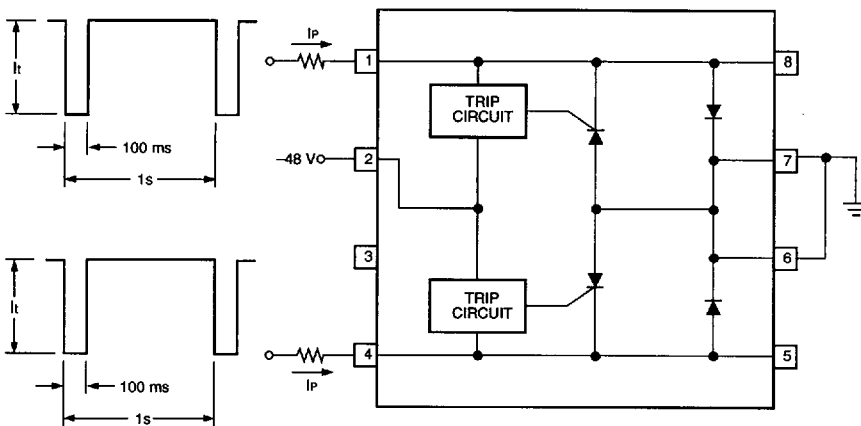


Figure 4. Test Circuit 3

Test Circuits (continued)

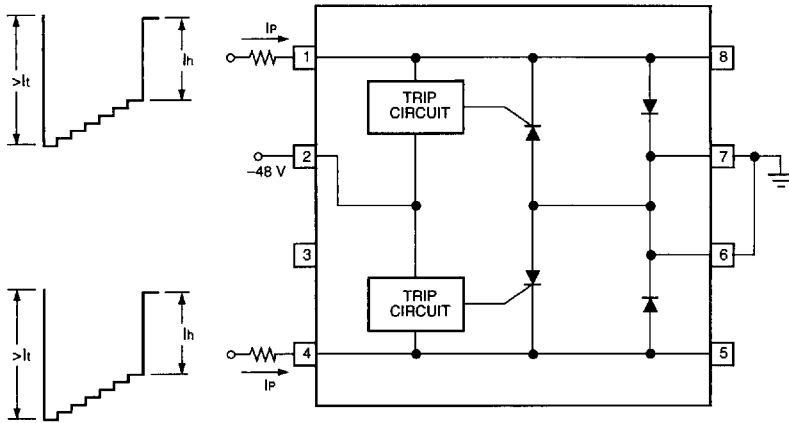


Figure 5. Test Circuit 4

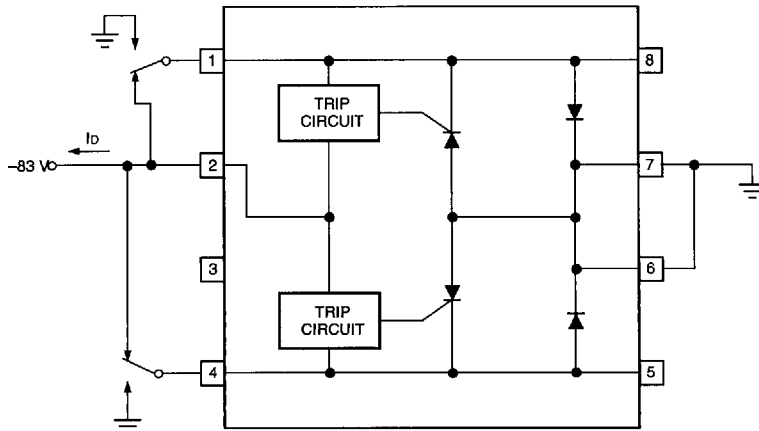
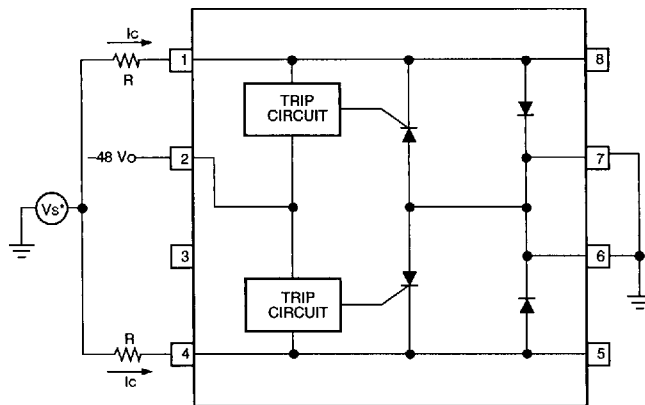


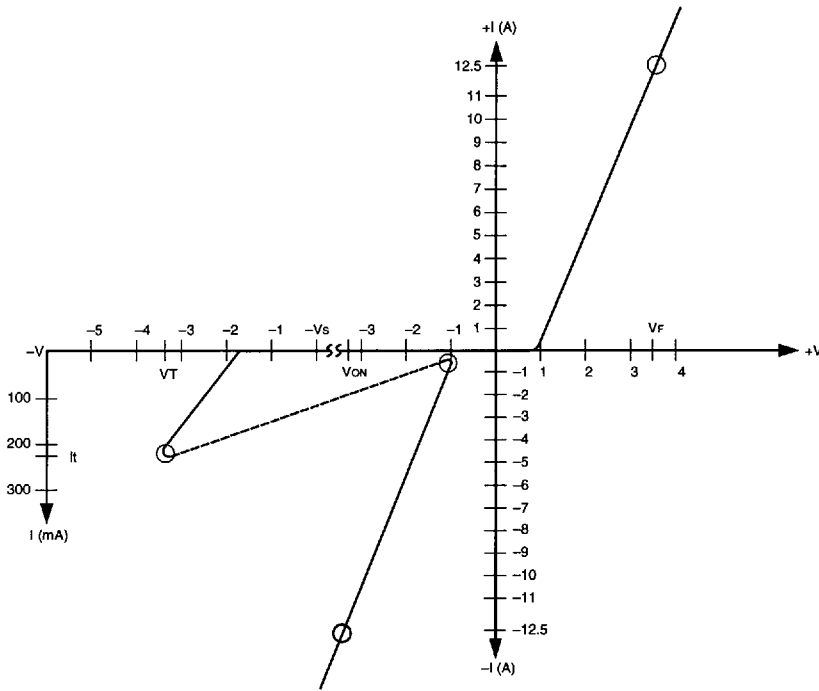
Figure 6. Test Circuit 5



* Set voltage V_s to $\cong -52\text{ V} + I_c \cdot R$ to achieve on-state condition in negative direction.

Figure 7. Test Circuit 6 Characteristic Curve

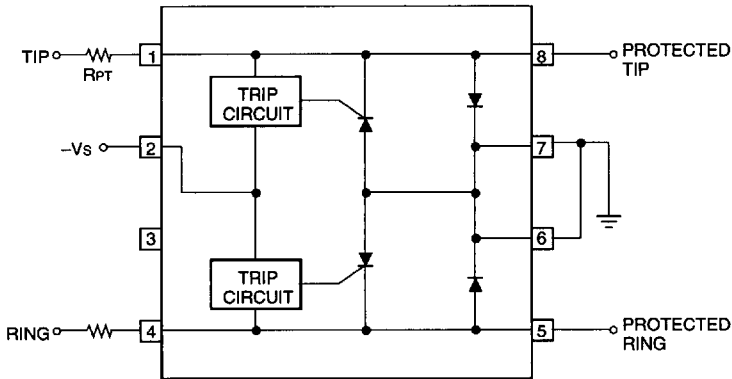
Characteristic Curve



○ Electrical characteristic points (see Electrical Characteristics Table).

Figure 8 . Typical Trip Characteristics of the SLIC Protector

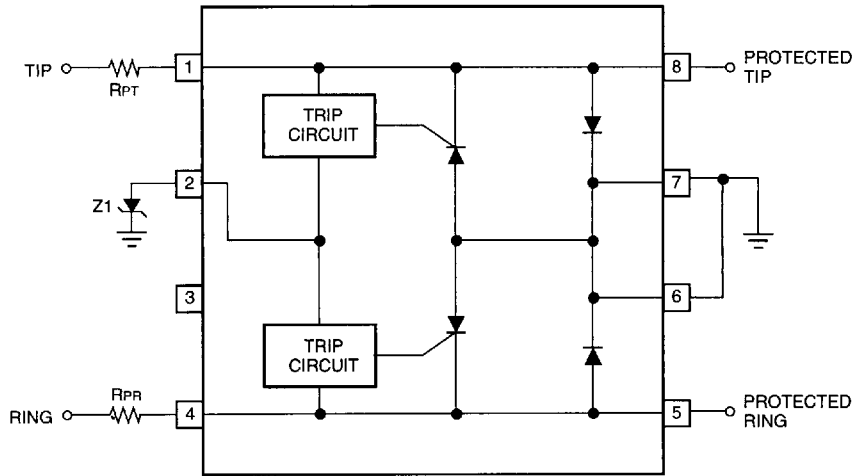
Applications



Note: In a standard configuration, the power supply Vs must be capable of providing about 700 mA (pulsed conditions or power cross) at worst case. RPT and RPR must be properly selected for proper operation and/or response to fault currents.

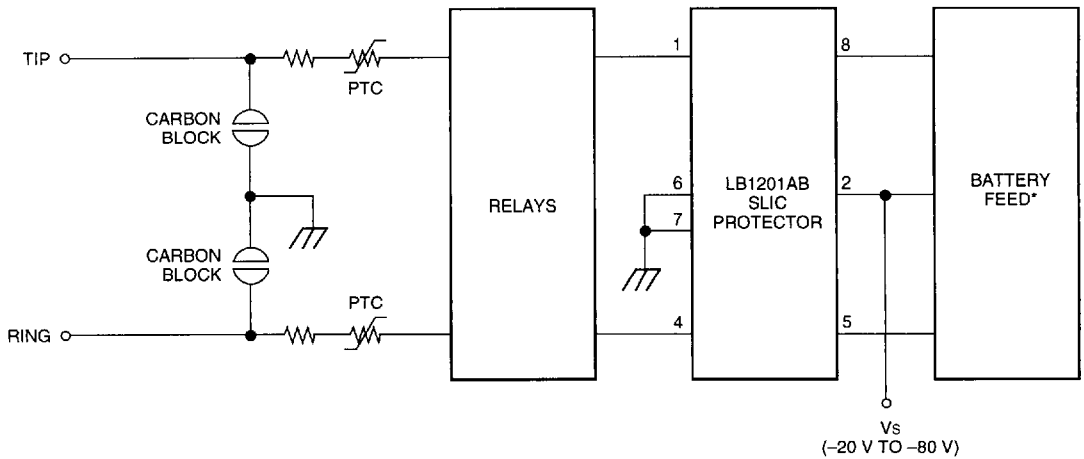
Figure 9. Standard Configuration

Applications (continued)



Note: This configuration can be used if the power supply cannot provide 700 mA or if protection is desired at a voltage different than available supplies. Zener diode Z1 is used to set the trip voltage. This diode must be capable of handling 700 mA under pulsed or power-cross conditions and handling the appropriate power involved under faults, especially power crosses. Set the voltage between 25 V and 80 V, as desired by the choice of Z1.

Figure 10. Alternate Power Supply Configuration



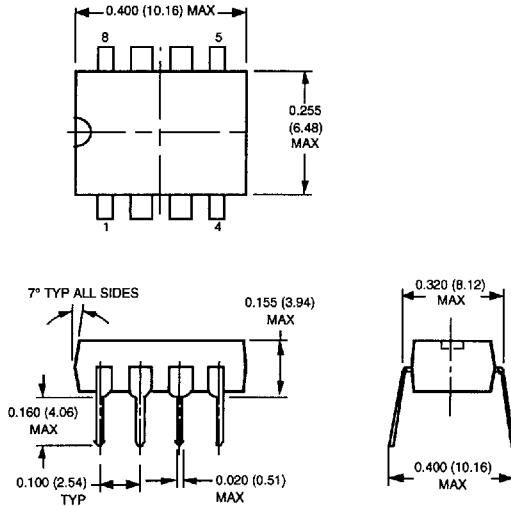
* An example device is AT&T's LB1276AF SLIC IC.

Figure 11. Fully Protected Electronic TIP-RING Interface
(Not all devices may be needed in all applications.)

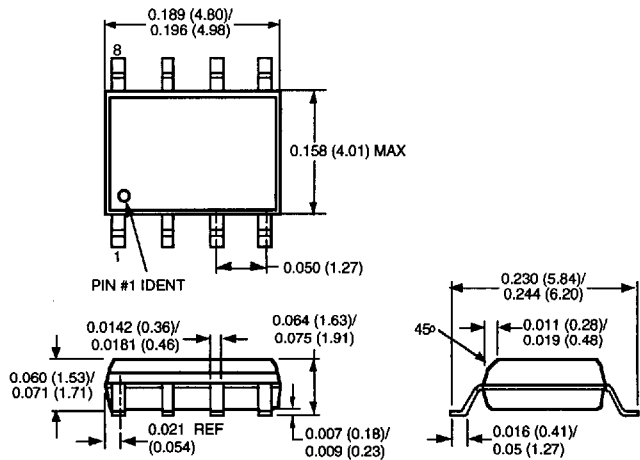
Outline Drawings

Dimensions are in inches and (millimeters).

8-Pin DIP (LB1201AB)



8-Pin, SONB (LB1201AS)



Packaging and Ordering Information

Throughout this section the following abbreviations are used:

DIP — Dual in-line package; SOG — Small-outline gull wing; SOJ — Small-outline J-lead; SONB — Small-outline narrow body; PLCC — Plastic leaded chip carrier.

Device Code	Package Type	Temperature
ATTL7551AP	44-Pin PLCC	-40 °C to +85 °C
ATTL7551AF	24-Pin DIP	-40 °C to +85 °C
ATTL7554AP	44-Pin PLCC	-40 °C to +85 °C
ATTL7556AAU	32-Pin PLCC	-40 °C to +85 °C
ATTL7557AAU		
ATTL7561AP	44-Pin PLCC	-40 °C to +85 °C
ATTL7564AP		
ATTL7581AC/BC	16-Pin DIP	-40 °C to +85 °C
ATTL7581AAE/BAE	16-Pin Plastic SOG	-40 °C to +85 °C
ATTL7582AE/BE	16-Pin Plastic DIP	-40 °C to +85 °C
ATTL7582AAE/BAE	16-Pin Plastic SOG	-40 °C to +85 °C
ATTL7583AF/BF	24-Pin Plastic DIP (600 mil)	-40 °C to +85 °C
ATTL7583ACG/BCG	24-Pin Plastic DIP (300 mil)	-40 °C to +85 °C
ATTL7583AAJ/BAJ	28-Pin Plastic SOG	-40 °C to +85 °C
ATTL7590AAF	14-Pin	-40 °C to +85 °C
ATTL7591AB	8-Pin, DIP	-40 °C to +85 °C
ATTL7591AS	8-Pin, SONB	-40 °C to +85 °C
LB1011AB	8-Pin, DIP	-20 °C to +70 °C
LB1013AD	18-Pin, DIP	-25 °C to +85 °C
LB1060AB	8-Pin, DIP	-40 °C to +65 °C
LB1201AB	8-Pin, DIP	-40 °C to +85 °C
LB1201AS	8-Pin, SONB	-40 °C to +85 °C
LB1208AAJ	28-pin SOG	-40 °C to +85 °C
LB1276AP	44-Pin PLCC	-40 °C to +85 °C
LB1276AF	24-Pin DIP	-40 °C to +85 °C
LB1356AF	24-Pin DIP	-40 °C to +85 °C
LH1263AR	20-Pin Plastic DIP	-40 °C to +85 °C
LH1571AB	8-pin Plastic DIP	-40 °C to +85 °C
LH1571AAC	8-pin SOG	-40 °C to +85 °C
T - 7503 - - - EL	20-Pin, SOJ	-40 °C to +85 °C
T - 7503 - - 1EC	20-Pin, SOJ	0 °C to 70 °C
T - 7504 - - - PL	28-Pin, DIP	-40 °C to +85 °C
T - 7504 - - - ML	28-Pin, PLCC	-40 °C to +85 °C
T - 5504 - - - PL	28-Pin, DIP	-40 °C to +85 °C
T - 5504 - - - ML	28-Pin, PLCC	-40 °C to +85 °C
T - 7513B - - EE	20-Pin, SOJ	-40 °C to +85 °C
T - 7513B - - PE	20-Pin, DIP	-40 °C to +85 °C
T - 7517A - - EE	16-Pin, DIP	-40 °C to +85 °C
T - 7517A - - PE	16-Pin, SOJ	-40 °C to +85 °C
T - 7548 - - - ME2	28-Pin, PLCC	0 °C to 85 °C
T - 7570 - - - ML2	28-Pin, PLCC	-40 °C to +85 °C