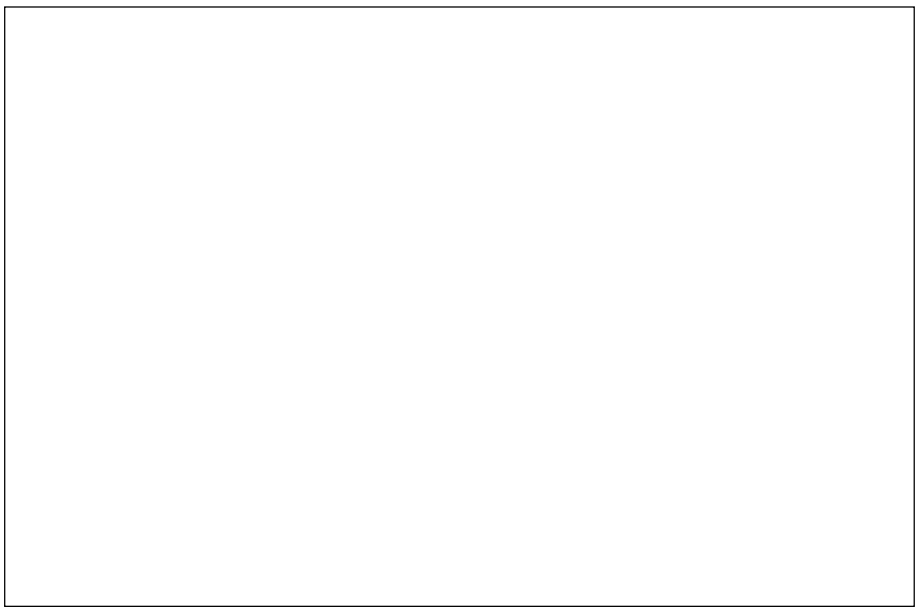
TB 201
Testboard for SLIC
PBL 3796, 3798, 3799

The testboard offers an easy way of getting familiar with Ericsson Central Office SLIC.
The SLIC includes all standard BORSCHT functions like DC feed, two-to-four-wire and four-to-two-wire conversion, signalling and on top of that a DC-regulator for lowest power consumption. Together with your choice of CODEC/filter this board fulfills all necessary Subscriber Line Interface functions.



Key Features

- FCC & ITU-T compatible low power SLIC.
- FCC & ITU-T compatible Line Protecting Circuits.
- Small space hybrid Ring Trip network.
- Integrated Transient Protector.
- Extensive programmability.
- Measurement friendly board design.

Quick Start

All that is needed to run the testboard is power supplies for the battery voltage and for +/- 12 V, togetherwith a 256 kHz clock generator, signal generator generating voice band signals and an oscilloscope is useful to start measurements. The digital input signals can be programmed with DIL-switches on the testboard. The state of digital input is shown by LED indicators. When delivered, the testboard is configured as follows:

- 600 ohm terminating impedance
- 4-wire to 2-wire gain 0.6 dB (600 ohm load)
- 2-wire to 4-wire gain -0.6 dB
- The hybrid function is balanced for a 600 ohm load
- loop current detector threshold = 9 mA
- Active state, loop current detector enabled

Connecting Terminals

Power Supply

+12 V	Positive power supply
- 12 V	Negative power supply
V_{Bat}	Battery voltage
GND	Ground reference

Input Signals

VRX	Analog input signal from CODEC/filter
RING 1	Ring signal without protection
RING 2	Ring signal with ring generator protection
DR	Positive input to ring trip comparator
DT	Negative input to ring trip comparator
C1 - C4	Decoder inputs controlling the SLIC operating modes and states, TTL compatible
E0 or E1	E0 is used with PBL 3796 and E1 with PBL 3798 and PBL 3799. E0 enables the detector output DET, TTL compatible, active low. E1 selects loop or ground key detector.

Output Signals

VTX	Analog output, DC -coupled, directly from SLIC 4-wire output. Can be connected directly to SLAC or SICOFI.
VFLT	Analog output from transhybrid network. Can be connected to the input stage of a CODEC device.
VT	Analog output from OP-amp on the testboard. This OP-amp can be used as a replacement for the input stage of a CODEC device.
TIP	Two-wire output, A-wire.
RING	Two-wire output, B-wire.
EXT.RING	Output to external ringtrip network.
DET	Loop current, ground key or ring trip detector output. Loop current or ground key detector is selected with E1. Ring trip detector is only active in ringing state, active low.

Functional Description

The testboard has some major building blocks. These are the SLIC, overvoltage protection, ringing and transhybrid function. Beside these functions, there are some additional circuits for DC supply regulation and LED-drivers. The components within the white lines on the PCB are the ones used for the subscriber line interface function and for the DC/DC converter.

SLIC

This block contains all the components that are normally associated with a SLIC design. Components that define the battery feed, detector thresholds and gain for example.

Please refer to the section ”Design Information” below for more information, how to select the correct component values for the application in question.

Overvoltage Protection

The protection consists of an Ericsson line resistor PBR 510 12/1 with the resistance 2•40 Ω designed to meet ITU-T rec. K.20 requirements. If the resistors are exposed to power cross conditions, the substrate will break (fuse function) and open the circuit.

Behind the resistors there is a TISP (Transient protection circuit) which will clamp all positive voltages to +3V and all negative voltages to -68 V, in order to protect the SLIC from excessive tension. *Note.*The TISP on this testboard is no longer the one that we recommend for this SLIC see application note for updated information.

Ringing

The internal ring trip network is designed for unbalanced ring injection with Vbat = -48 V.

The ring trip network, PBA 3310 from Ericsson Components AB, is a two-stage filter network on a small hybrid substrate. The network connects directly to ring relay and to the SLIC DT comparator input. PBA 3310 is designed to operate with up to 5 tele-phones in parallel and with maximum ringing voltage of 110 Vrms super-imposed on battery voltage.

The detector output will not be stable for all sort of combinations and bell types. In these special cases it is possible to make detection by evaluating the duty cycle of the detector output.

If the ring signal is applied at RING1 then RING GEN PROT is included as protection for the ring generator, which may be damaged if ringing is made on a short circuited 2-wire.

At RING2, the protection is bypassed.If you need to use another type of ring trip network, you may disconnect the internal network with the three INT. RING jumpers. Connect EXT. RING to the input and DT to the output of your external ring trip network.

DC/DC Converter

The converter is a switched mode regulator used to significantly reduce the power dissipation. The SLIC sets a reference voltage internally to a value high enough to feed the loop and maintain high transmission quality. The reference voltage controls the switch so that the battery voltage is down converted to a level which equals the reference voltage. The regulated voltage can be measured at pin 2 on the SLIC.

To work properly, the regulator needs a 256 kHz external TTL-compatible clock signal. This clock signal sets the switching frequency of the converter.

Power Supply

Regulators for +/-5 V are provided on the test board to guarantee that those voltages are within tolerance. All of the supply voltages have passing jumpers, through which it is easy to measure current consumption.

Digital I/O

Digital input and output signals can be set by DIL-switches or, after disconnection of jumpers, by connection of external logic. When the DIL-switches are used, LED's indicate the logic level, at inputs.

C3	C2	C1	Status
0	0	0	Open circuit
0	0	1	Ringing state
0	1	0	Active state
0	1	1	Stand-by state
1	0	0	Tip open state
1	0	1	Reserved
1	1	0	Active polarity reversal state
1	1	1	Stand-by polarity reversal state

C4	
0	Test relay driver active
1	Test relay driver off

Table 1. Control inputs.

Design Information

Battery Feed

The PBL 3798 synthesizes a constant current feed system while the PBL 3796 and PBL 3799 synthesize a resistive battery feed system. The PBL 3796 has a short line current limiter. Refer to the datasheets for details about how to program the feeding with the external resistors R_{DC1} and R_{DC2}.

Loop Current Detector

The threshold is set by the R_D resistor, nominally Iloop = 9 mA.

Terminating Impedance

The terminating impedance is set by $Z_T = R_T + R_{TP}//C_{TP}$ and can be any complex impedance.

If your impedance is real (R_T), a jumper is used to bypass $R_{TP}//C_{TP}$.
The line resistors should be added when calculating the resistive part of the impedance. If the terminating resistance = 600 Ω then $R_F*2 + R_T/100 = 600\ \Omega$.
$R_F = 40\Omega$ gives us $R_T = 52\ k\Omega$.

4-Wire to 2-Wire Gain

The 4-wire input signal is inserted at the V_{RX} terminal and the SLIC input level is set by the $Z_{RX} = R_{RX} + R_{RXP}//C_{RXP}$, which can be modified for suitable gain and frequency characteristic.
A jumper is used to bypass $R_{RXP}//C_{RXP}$ when not used. Consult data sheet for equations.

2-Wire to 4-Wire Gain

Gain is internally set to $(Z_T/100) / (Z_T/100 + R_F*2)$.

Trans-Hybrid Balance

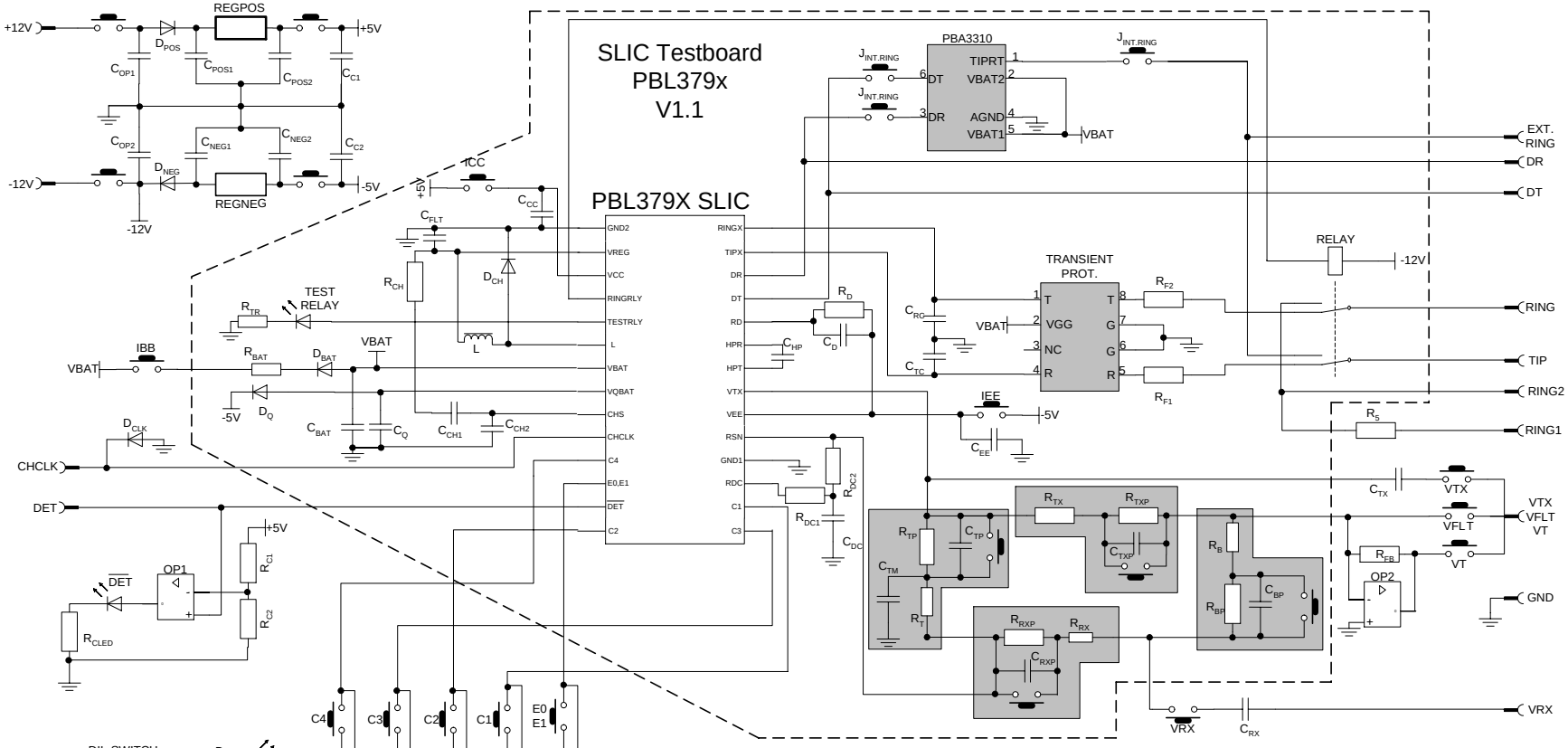
This network $Z_B = R_B + R_{BP}//C_{BP}$, is used to separate the subscriber voice signal from the 4-wire input voice signal (2-wire to 4-wire conversion).

The remaining 4-wire output signal is then connected to a CODEC/filter combination.

In this case we use the LM627 OP-amp as replacement for the input stage of a CODEC device. The Z_B network is used in combination with the $Z_{TX} = R_{TX} + R_{TXP}//C_{TXP}$ network which is set to a fixed value.

Note : If you use signal processing CODECs like SLAC or SICOFI, both Z_{TX} and ZB networks are omitted.

If you have any technical questions regarding the design with a Ericsson CO-SLIC, please do not hesitate to contact one of our Telecom System Applications Engineers.


SLIC Testboard
PBL379x
V1.1
PBL379X SLIC
REGPOS
REGNEG
+12V
-12V
+5V
-5V
PBA3310
TIPRT
VBAT2
VBAT1
AGND
DT
DR
VBAT
EXT.
RING
TIP
RING2
RING1
RELAY
TRANSIENT
PROT.
TEST
RELAY
IBB
ICC
IEE
GND1
GND2
VREG
VCC
RINGRLY
TESTRLY
VQBAT
CHS
CHCLK
E0,E1
RINGX
TIPX
RD
HPR
HPT
VTX
VEE
RSN
RDC
VGG
NC
CHCLK
DET
OP1
OP2
VTX
VFLT
VT
VRX
GND
DIL-SWITCH
C4
C3
C2
C1
E0
E1
EXTERNAL COMPONENTS:
4-WIRE:
RT = 52,3 k 1% 1/4 W *
RRX = 26,1 k 1% 1/4 W *
RTX = 20,0 k 1% 1/4 W *
RB = 20,0 k 1% 1/4 W *
RFB = 20,0 k 1% 1/4 W *
CTX,CRX = 220nF 20% 10V
OP2 = LM627
2-WIRE:
RF1,RF2 = 40 ohm, PBR 510 12/1
CHP = ** 20% 100V *
CTC,CRC =2,2nF 10% 100V
TRANSIENT PROT. = CHEK DATASHEET
RELAY = OMRON G2VN,12V
RING DETECTOR:
RINGTRIP NETWORK = PBA 3310
RS = 470 ohm 9W
POWER & DECOUPLING:
RBAT = 10 ohm 10% 1/4 W
CBAT = 470nF 20% 100V
CQ = 330nF 20% 100V
CCC,CEE = 220nF 20% 10V
COP1,COP2,CC1,CC2 = 47nF 20% 20V
CPOS1,CNEG1 = 330 nF 20% 20V
CPOS2,CNEG2 = 100nF 20% 10V
DBAT,DQ,DPOS,DNEG,DCLK = 1N4002
REGPOS = LM7805
REGNEG = LM7905
LOOP DETECTOR:
RD = 51,1 k 5% 1/4 W *
CD = 6,8nF 20% 10V *
LOGIC:
RC1 = 56 k 1% 1/4 W
RC2 = 45k 1% 1/4 W
BATTERY FEED:
RDC1,RDC2 = ** 5% 1/4 W *
CDC = ** 20% 10V *
DC/DC CONVERTER:
RCH = 910 ohm 2% 1/4 W
CCH1 = 47nF 10% 100V
CCH2 = 1,5nF 10% 100V
CFLT = 470nF 10% 100V
L = 1,2mH 17,5 ohm 10%Rin >=15 ohm
Siemens B78108-S1125
DCH = 1N4448 100V 100mA 10nS
* = QUICK CHANGE
** = SLIC DEPENDENT, CHEK DATASHEET.

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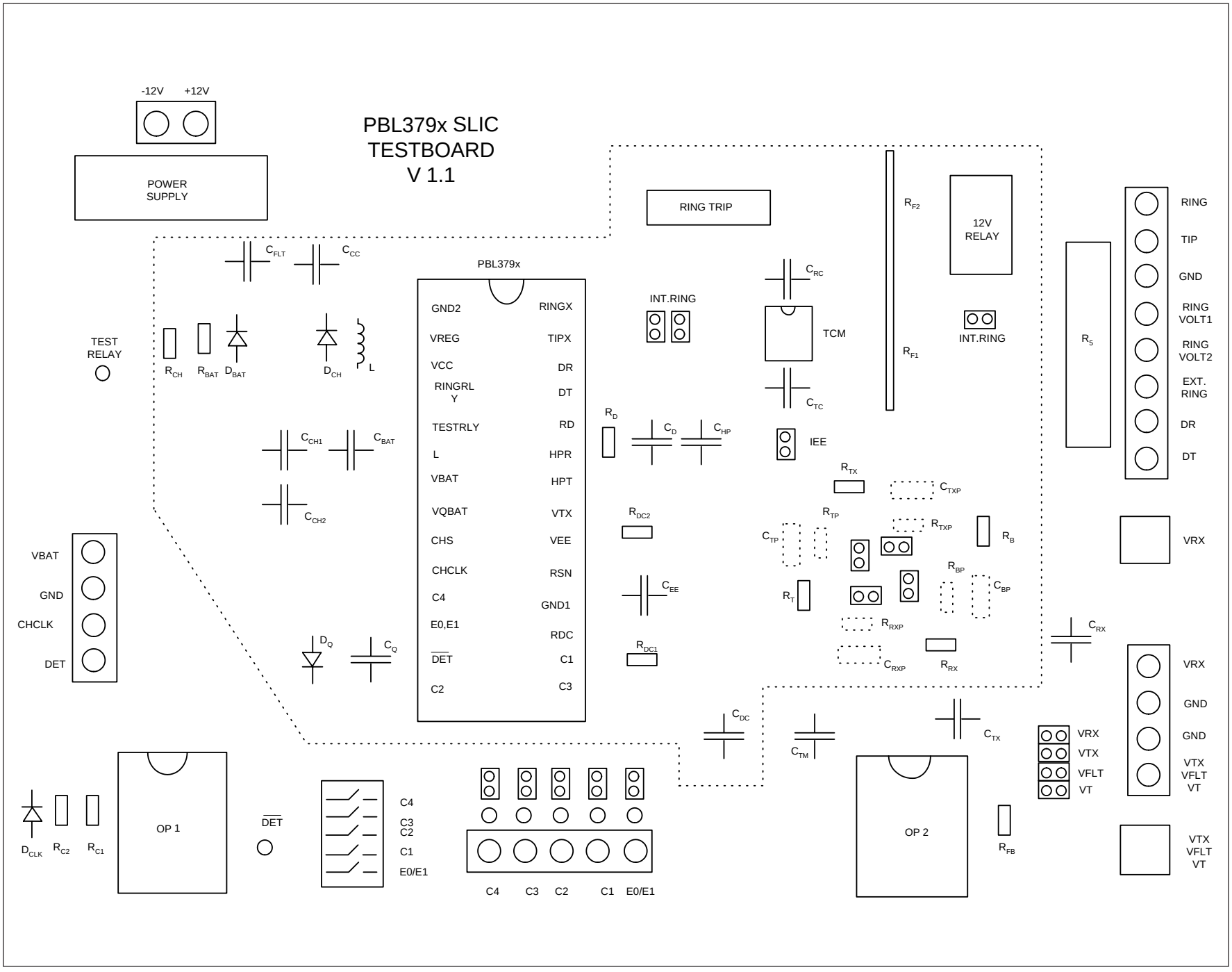
PBL379x SLIC
TESTBOARD
V 1.1
-12V
+12V
POWER
SUPPLY
RING TRIP
12V
RELAY
PBL379x
GND2
VREG
VCC
RINGRL
Y
TESTRLY
L
VBAT
VQBAT
CHS
CHCLK
C4
E0,E1
DET
C2
RINGX
TIPX
DR
DT
RD
HPR
HPT
VTX
VEE
RSN
GND1
RDC
C1
C3
INT.RING
TCM
IEE
INT.RING
TEST
RELAY
RING
TIP
GND
RING
VOLT1
RING
VOLT2
EXT.
RING
DR
DT
VRX
VBAT
GND
CHCLK
DET
VRX
GND
GND
VTX
VFLT
VT
VRX
VTX
VFLT
VT
VTX
VFLT
VT
OP 1
OP 2
C4
C3
C2
C1
E0/E1
C4 C3 C2 C1 E0/E1

Specifications subject to change
without notice.
LZT-15322 TB 201 Uen Rev. A

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Ericsson Components AB
S-164 81 KISTA-Stockholm, Sweden
Telephone: (08) 757 50 00