

## 5.2 Model SU-200/SU-250 Single-Line Subscriber Unit

The following sections provide specifications for the Model SU-200 and Model SU-250 Single-Line Subscriber Unit.

### 5.2.1 Functional

Table 5-7 summarizes the Model SU-200/SU-250 Subscriber Unit capabilities.

Parameter	Specification
interconnection supported	<ul style="list-style-type: none"> <li>◆ Model SU-200/SU-250 SLSU capabilities               <ul style="list-style-type: none"> <li>◆ standard 2-wire phoneset to/from subscriber</li> <li>◆ basic voice service</li> <li>◆ air interface to/from DIVA-2000 Wireless Local Loop (800 MHz band)</li> </ul> </li> <li>◆ Model SU-250 SLSU capabilities               <ul style="list-style-type: none"> <li>◆ Group 3 V.29 facsimile (up to 9600 bps)</li> <li>◆ V.22bis data modem (up to 2400 bps)</li> <li>◆ payphone signaling (continuous polarity reversal, pulsed polarity reversal, 12 kHz, or 16 kHz signaling)</li> </ul> </li> </ul>
connection type	RJ-11C modular connector
multiple extensions	<ul style="list-style-type: none"> <li>◆ maximum loop resistance of 600 Ohms (including total two-way line resistance)</li> <li>◆ up to 5 REN (Ringer Equivalency Number)</li> </ul>
antennas	<ul style="list-style-type: none"> <li>◆ 2 built-in omnidirectional antennas</li> <li>◆ connection for external directional antenna</li> </ul>
air interface	compatible with DIVA-2000 Wireless Local Loop (operating in 800 MHz band)
test features	<ul style="list-style-type: none"> <li>◆ self-test upon power-up               <ul style="list-style-type: none"> <li>◆ memory checksum</li> <li>◆ presence of perch channel table configuration</li> <li>◆ presence of MSI value</li> </ul> </li> <li>◆ remote diagnostics               <ul style="list-style-type: none"> <li>◆ received signal strength</li> <li>◆ bit error rate</li> </ul> </li> </ul>
battery backup	2.2 Amp-Hour lead-acid battery <ul style="list-style-type: none"> <li>◆ &gt; 2 hours talk time (at 25°C)</li> <li>◆ &gt; 10 hours standby time (at 25°C)</li> <li>◆ &lt; 20 hours charge time (at 25°C)</li> <li>◆ &gt; 2 years operational life</li> </ul>
LED indicators	single multi-color LED (green/orange/red) <ul style="list-style-type: none"> <li>◆ Active state</li> <li>◆ received signal strength</li> <li>◆ low battery power</li> <li>◆ fault condition</li> </ul>

**Table 5-7** Model SU-200/SU-250 Single-Line Subscriber Unit Functional Specifications

<p>default audible cues</p> <ul style="list-style-type: none"> <li>❖ programmable</li> <li>❖ generated by SLSU in cases when cues from local exchange are not available</li> </ul>	<ul style="list-style-type: none"> <li>◆ network congestion tone             <ul style="list-style-type: none"> <li>❖ combined tones: 480/620 Hz</li> <li>❖ -20 dBm</li> <li>❖ tone duration: 0.25 secs</li> <li>❖ silence: 0.3 secs</li> </ul> </li> <li>◆ off-hook warning tone             <ul style="list-style-type: none"> <li>❖ combined tones: 1400/2000 Hz</li> <li>❖ -10 dBm</li> <li>❖ tone duration: 0.1 secs</li> <li>❖ silence: 0.1 secs</li> </ul> </li> <li>◆ pre-dial tone             <ul style="list-style-type: none"> <li>❖ 800 Hz</li> <li>❖ -20 dBm</li> <li>❖ tone duration: 0.005 secs</li> <li>❖ silence: 0.8 secs</li> </ul> </li> <li>◆ out of service tone             <ul style="list-style-type: none"> <li>❖ combined tones: 480/620 Hz</li> <li>❖ -12 dBm</li> <li>❖ tone duration: 0.1 secs</li> <li>❖ silence: 0.1 secs</li> </ul> </li> </ul>
<p>AC adapter</p>	<ul style="list-style-type: none"> <li>◆ AC input characteristics             <ul style="list-style-type: none"> <li>❖ voltage: 100 to 240 VAC</li> <li>❖ frequency: 47 to 63 Hz</li> <li>❖ max. current (at 115 VAC full load): 1.5 A</li> <li>❖ efficiency (at 115 VAC full load): ≥ 75%</li> </ul> </li> <li>◆ output rating: +15 VDC, 1.5 A</li> <li>◆ DC output characteristics             <ul style="list-style-type: none"> <li>❖ ripple and noise (at 115/230V max. load): 150 mV p-p</li> <li>❖ line regulation (at min., max. load): ±1%</li> <li>❖ load regulation (at min., max. load): ±5%</li> </ul> </li> <li>◆ environmental requirements             <ul style="list-style-type: none"> <li>❖ operating temperature: 0 to +50°C (ambient)</li> <li>❖ operating humidity: 0 to 85% (non-condensing)</li> <li>❖ storage temperature: -10 to +80°C (ambient)</li> <li>❖ storage humidity: 10 to 90% (non-condensing)</li> </ul> </li> <li>◆ dimensions             <ul style="list-style-type: none"> <li>❖ length: 146 mm</li> <li>❖ width: 76 mm</li> <li>❖ height: 43.5 mm</li> </ul> </li> <li>◆ power cord             <ul style="list-style-type: none"> <li>❖ connector at AC adapter: IEC 320</li> <li>❖ plug type as required</li> </ul> </li> <li>◆ UL approved</li> </ul>

**Table 5-7** Model SU-200/SU-250 Single-Line Subscriber Unit  
Functional Specifications (continued)

## 5.2.2 Performance

Table 5-8 summarizes the performance of the SLSU's subscriber equipment interface.

Parameter	Value
loop voltage	-28 to -21 VDC
off hook detection	> 10 mA
on hook detection	< 9.5 mA
maximum loop current	< 34 mA
maximum loop resistance	600 Ohms (including telephones and total 2-wire line resistance)
impedance	nominal 600 Ohms (900 Ohms factory option)
ringer max load	North American 5 REN (1380 $\Omega$ + 40 $\mu$ F)
2-wire return loss	$\geq$ 20 dB
echo cancellation	◆ 4 ms endpath delay toward subscriber ◆ < -40 dBm residual echo level (-30 to -10 dBm signal)
transmit gain flatness	$\pm$ 0.1 dB (300-3000 Hz)
receive gain flatness	$\pm$ 0.1 dB (300-3000 Hz)
output level from SU (load of 600 Ohms)	-6.0 dBm (@ 1000 Hz)
idle channel noise	$\leq$ 20 dBmc
longitudinal balance	◆ $\geq$ 46 dB (600-3400 Hz) ◆ $\geq$ 40 dB (300-600 Hz)
ring voltage at 1 REN	75 Vrms $\pm$ 20%
ring voltage at 5 REN	$\geq$ 40 Vrms
ring current	40 mA maximum at 5 REN
ring trip	600 Ohms or less
ring frequency	programmable, from 15 to 30 Hz in 1 Hz increments
ring cadence	programmable (0-6400 ms on; 0-6400 ms off)
ring waveform	quasi-square wave
ring waveform crest factor	typical 1.33 (from 1.10 to 1.37)
loop start	yes
DTMF detection	yes; as needed to support DTMF signaling to local exchange via DIVA-2000
DTMF frequency tolerance	◆ operation (detect): $\leq$ 2.3% ◆ non-operation (reject): $\geq$ 3.5%

**Table 5-8** Model SU-200/SU-250 Single-Line Subscriber Unit  
Subscriber Equipment Interface Specifications

Parameter	Value
DTMF signal duration	<ul style="list-style-type: none"> <li>◆ operation: <math>\geq 50</math> ms</li> <li>◆ non-operation: <math>\leq 20</math> ms</li> </ul>
DTMF pause duration	<ul style="list-style-type: none"> <li>◆ operation: <math>\geq 50</math> ms</li> <li>◆ non-operation (signal interruption): <math>\leq 20</math> ms</li> </ul>
DTMF power levels per frequency	<ul style="list-style-type: none"> <li>◆ operation: 0 to -16 dBm</li> <li>◆ non-operation: <math>\leq -29</math> dBm</li> </ul>
DTMF power level difference between frequencies	$\leq 10$ dB
pulse dial detection	yes
pulse dial rate	programmable (8-24 pps)
pulse dial interdigit time	programmable (100 to 740 ms)
pulse dial make/break ratio	programmable (25 to 75%)
hook flash minimum detect time	programmable (50 to 2610 ms)
hook flash maximum detect time	programmable (80 to 2640 ms)
off hook detect time	programmable (80 to 2400 ms)
on hook detect time	programmable (200 to 2760 ms)
hazardous voltage protection	designed to meet UL 1459

**Table 5-8** Model SU-200/SU-250 Single-Line Subscriber Unit  
Subscriber Equipment Interface Specifications (continued)

Table 5-9 summarizes aspects of the subscriber equipment interface that are unique to the Model SU-250 Single-Line Subscriber Unit.

Parameter	Value
facsimile support	standard Group 3 facsimile machines (up to 9600 bps)
voiceband data modem support	standard V.22bis data modems (up to 2400 bps)
payphone support	<ul style="list-style-type: none"> <li>◆ continuous polarity reversal, pulsed polarity reversal, 12 kHz, or 16 kHz signaling</li> <li>◆ selected via System Management Software</li> </ul>
12/16 kHz signaling frequency tolerance	$\pm 1\%$
12/16 kHz signaling harmonic distortion	$< 1\%$
12/16 kHz signaling tone transmission level	<ul style="list-style-type: none"> <li>◆ 2.2 V peak-to-peak at 600<math>\Omega</math></li> <li>◆ tolerance of <math>\pm 2\%</math></li> </ul>
12/16 kHz signaling tone rise/fall time	nominal 12 ms
12/16 kHz signaling tone duration	<ul style="list-style-type: none"> <li>◆ programmable (50 to 800 ms)</li> <li>◆ selected via System Management Software</li> </ul>
12/16 kHz maximum pulse rate	<ul style="list-style-type: none"> <li>◆ 20 pps (50 ms intertone duration)</li> <li>◆ selected via System Management Software</li> </ul>
polarity reversal pulse duration	<ul style="list-style-type: none"> <li>◆ programmable (100 to 1600 ms)</li> <li>◆ selected via System Management Software</li> </ul>

**Table 5-9** Model SU-250 Single-Line Subscriber Unit  
Subscriber Equipment Interface Specifications

Table 5-10 summarizes the performance of the SLSU's air interface

Parameter	Specification
multiple access	3 TDM slots per RF carrier (TDM-3)
modulation	$\pi/4$ DQPSK with 50% excess bandwidth ( $\alpha$ )
occupied bandwidth	32 kHz (99.5% total power)
TDM burst bit rate	42 kbps
traffic bit rate	11.2 kbps
speech channel coding	rate 9/17 convolutional code
speech source coding	full-rate VSELP (6.7 kbps)
uplink band (MBS receive/SLSU transmit)	824-849 MHz
downlink band (MBS transmit/SLSI receive)	869-894 MHz
Tx/Rx spacing	45 MHz
carrier spacing	60 kHz
carrier interleaving	30 kHz
1st Tx carrier center	824.01 MHz (corresponding to AMPS channel assignments)
frequency accuracy	$\leq \pm 3$ ppm
maximum transmit power (at antenna port)	0.8 W (accuracy: +20%; -50%)
transmit power control	monotonically decreasing levels: <ul style="list-style-type: none"> <li>◆ 0.8 W (29.0 dBm) (accuracy: +0.8 dB; -3 dB)</li> <li>◆ 0.8 W - 4 dB (~318 mW; 25.0 dBm) (accuracy: +2 dB; -4 dB)</li> <li>◆ 0.8 W - 8 dB (~127 mW; 21.0 dBm) (accuracy: +2 dB; -4 dB)</li> <li>◆ 0.8 W - 12 dB (~50 mW; 17 dBm) (accuracy: +2 dB; -4 dB)</li> <li>◆ 0.8 W - 16 dB (~20 mW; 13 dBm) (accuracy: +2 dB; -4 dB)</li> <li>◆ 0.8 W - 20 dB (~8 mW; 9 dBm) (accuracy: +2 dB; -4 dB)</li> </ul>
leakage power in transmit bandwidth when carrier off	$\leq -60$ dBm
adjacent channel interference power (power radiated within $\pm 10.5$ kHz bandwidth at indicated offset from carrier during modulation)	<ul style="list-style-type: none"> <li>◆ <math>\leq -45</math> dBc at <math>\pm 50</math> kHz offset from carrier frequency</li> <li>◆ <math>\leq -60</math> dBc at <math>\pm 100</math> kHz offset from carrier frequency</li> </ul>

**Table 5-10** Model SU-200/SU-250 Single-Line Subscriber Unit  
Air Interface Specifications

Parameter	Specification
transmitter spurious emissions <ul style="list-style-type: none"> <li>❖ not including emissions during modulation at frequencies close to carrier</li> <li>❖ at antenna port</li> </ul>	<ul style="list-style-type: none"> <li>◆ <math>\leq 0.25 \mu\text{W}</math></li> <li>◆ <math>\leq -60 \text{ dBc}</math></li> </ul>
receiver spurious emissions <ul style="list-style-type: none"> <li>❖ emissions when in receive mode</li> <li>❖ at antenna port</li> </ul>	$\leq 4000 \mu\text{W}$
cabinet radiation	$\leq 25 \mu\text{W}$
modulation vector error	$\leq 12.5\%$
transmission bit rate accuracy	tracks received signal from base station ( $\leq \pm 5 \text{ ppm}$ )
receive sensitivity <ul style="list-style-type: none"> <li>❖ <math>10^{-2}</math> BER</li> <li>❖ no fading</li> <li>❖ at antenna port</li> </ul>	$\leq -109 \text{ dBm}$
receive noise figure	$\leq 7 \text{ dB}$
transmit/receive isolation	$\geq 110 \text{ dB}$
co-channel interference rejection (minimum C/I) <ul style="list-style-type: none"> <li>❖ <math>10^{-2}</math> bit error rate</li> <li>❖ desired signal +3 dB above receiver sensitivity</li> <li>❖ interfering signal modulated by pseudo-random binary sequence with 32,767-bit code length</li> <li>❖ no fading</li> </ul>	$\leq 13 \text{ dB}$
adjacent channel receive selectivity (ratio of interfering signal to desired signal) <ul style="list-style-type: none"> <li>❖ <math>10^{-2}</math> bit error rate</li> <li>❖ desired signal +3 dB above receiver sensitivity</li> <li>❖ interfering signal modulated by pseudo-random binary sequence with 32,767-bit code length with frequency offset as indicated</li> <li>❖ no fading</li> <li>❖ at antenna port</li> </ul>	<ul style="list-style-type: none"> <li>◆ <math>\geq 1 \text{ dB}</math> at <math>\pm 25 \text{ kHz}</math> offset from carrier frequency</li> <li>◆ <math>\geq 42 \text{ dB}</math> at <math>\pm 50 \text{ kHz}</math> offset from carrier frequency</li> <li>◆ <math>\geq 57 \text{ dB}</math> at <math>\pm 100 \text{ kHz}</math> offset from carrier frequency</li> </ul>

**Table 5-10** Model SU-200/SU-250 Single-Line Subscriber Unit  
Air Interface Specifications (continued)

Parameter	Specification
intermodulation performance (ratio of either of two interfering signals to desired signal) <ul style="list-style-type: none"> <li>❖ <math>10^{-2}</math> bit error rate</li> <li>❖ desired signal +3 dB above receiver sensitivity</li> <li>❖ interfering signal modulated by pseudo-random binary sequence with 32,767-bit code length with frequency offset as indicated</li> <li>❖ interfering signals at 100 and 200 kHz offsets from desired signal</li> <li>❖ no fading</li> <li>❖ at antenna port</li> </ul>	≥ 47 dB
spurious sensitivity (ratio of interfering signal to desired signal) <ul style="list-style-type: none"> <li>❖ <math>10^{-2}</math> bit error rate</li> <li>❖ desired signal +3 dB above receiver sensitivity</li> <li>❖ interfering signal modulated by pseudo-random binary sequence with 32,767-bit code length with frequency offset as indicated</li> <li>❖ interfering signals at 100 kHz offset from desired signal</li> <li>❖ no fading</li> <li>❖ at antenna port</li> </ul>	≥ 57 dB
maximum recommended VSWR	2:1 (open circuit tolerated for short periods)
maximum inbound input signal	≥ -40 dBm
antenna port impedance	50 Ohms
nominal antenna gain (built-in antennas)	0.0 dBd (2.1 dBi)
EMI	designed to meet FCC Part 15B

**Table 5-10** Model SU-200/SU-250 Single-Line Subscriber Unit  
Air Interface Specifications (continued)



### 5.2.3 Power

Table 5-11 summarizes the SLSU power requirements.

Parameter	Specification
DC input voltage	10.6 - 15.75 VDC
maximum current	1.5 Amps
average current during standby	<ul style="list-style-type: none"> <li>◆ 113 mA typical at 15 VDC</li> <li>◆ 140 mA typical at 12 VDC</li> </ul>
average current during talk (voice only)	<ul style="list-style-type: none"> <li>◆ 320 mA typical at 15 VDC</li> <li>◆ 400 mA typical at 12 VDC</li> </ul>
connection type	accepts female barrel plug <ul style="list-style-type: none"> <li>◆ 2.1 mm inner diameter</li> <li>◆ 5.5 mm outer diameter</li> </ul>

**Table 5-11** Model SU-200/SU-250 Single-Line Subscriber Unit Power Requirements

### 5.2.4 Physical

Table 5-12 summarizes the SLSU physical specifications.

Parameter	Specification
height	280.6 mm (including built-in antennas)
width	245 mm
depth	<ul style="list-style-type: none"> <li>◆ minimum: 37 mm</li> <li>◆ maximum: 57 mm</li> </ul>
weight	<ul style="list-style-type: none"> <li>◆ Model SU-200 SLSU               <ul style="list-style-type: none"> <li>◆ 0.6 kg (without battery)</li> <li>◆ 1.6 kg (with battery)</li> </ul> </li> <li>◆ Model SU-250 SLSU               <ul style="list-style-type: none"> <li>◆ 0.7 kg (without battery)</li> <li>◆ 1.7 kg (with battery)</li> </ul> </li> </ul>
material	ABS-V0

**Table 5-12** Model SU-200/SU-250 Single-Line Subscriber Unit Physical Characteristics

### 5.2.5 Environment

Table 5-13 summarizes the SLSU environmental requirements.

Parameter	Specification
operating temperature	0 to +50°C (ambient)
storage temperature	-40 to +85°C, not including battery
relative humidity	10% to 90% (non-condensing)

**Table 5-13** Model SU-200/SU-250 Single-Line Subscriber Unit  
Environmental Requirements