L-Band Block Upconverter

C, X, Ku, K-Band

SBU-Type

Key features SBU-Type

- Based on MMIC technology
- Low phase noise
- Adjustable attenuator (range: 0..20 dB, 0.1 dB step size)
- Output power +10 dBm (1dB compression point)
- Low spurious emissions
- Internal OCXO with long term stability 10-7 / year
- External reference input 5 or 10 MHz
- Local control through push buttons on front panel and display menu
- Remote control through RS232, RS422/485 (2-wire or 4-wire) interfaces, TCP/IP over Ethernet, Web browser interface, SNMP (MIBs are provided).
- Packet command syntax supports RS485 bus systems and allows addressed operation.
- Stored alarms with time stamps
- Summary alarm output (DPDT)
- Low power consumption typ. less than 15 W
- CE compliant
- **3 years warranty**

SBUL-Type

Key features SBUL-Type

- Based on MMIC technology
- Low phase noise
- Adjustable attenuator (range: 0..19 dB, 1 dB step size) through attenuator selector on front panel
- Output power +10 dBm (1dB compression point)
- Low spurious emissions
- Internal OCXO with long term stability 10-7 / year
- External reference input 5 or 10 MHz
- L-Band monitor output on front panel
- Summary alarm output (DPDT)
- RS232 diagnostic interface
- Low power consumption typ. less than 13 W
- CE compliant
- **3 years warranty**

L-Band Block Upconverter

Indoor Version

Single Band L-Band to C, X, Ku, K-Band

Upconverter Type:		SBU/SBUL-C	SBU/SBUL-X	SBU/SBUL-Ku1 – SBU/SBUL-Ku3	SBU/SBUL-K1	SBU-K-2
RF-Output Frequency:		C-Band 5.85 .. 6.45 GHz	X-Band 7.90 .. 8.40 GHz	Ku-Band Ku1: 13.75 .. 14.50 GHz Ku3: 12.75 .. 13.50 GHz	K-Band 17.30 .. 18.10 GHz	K-Band 17.30 .. 17.95 GHz 17.75 .. 18.40 GHz
LO Frequency:		4.90 GHz	6.95 GHz	12.80 GHz (Ku1) 11.80 GHz (Ku3)	16.35 GHz	15.90 / 16.35 GHz switchable
Phase Noise:	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	- 58 - 70 - 80 - 89 - 95 - 115	- 58 - 70 - 80 - 89 - 95 - 115	- 58 - 70 - 80 - 85 - 93 - 120	- 58 - 72 - 78 - 88 - 110 - 120	- 58 - 72 - 76 - 85 - 93 - 115
		max values in dBc/Hz				
IF-Input Frequency		950 .. 1550 MHz	950 .. 1450 MHz	950 .. 1700 MHz	950 .. 1750 MHz	1400 .. 2050 MHz
Conversion Scheme:		Block up conversion, no frequency inversion				
IF-Input Characteristics:		Impedance: 50 Ω Return Loss: >18 dB Connector: SMA (female)				
IF-Monitor (SBUL only):		Signal level in reference to input: -20 dB Impedance: 50 Ω Connector: SMA (female)				
RF-Output Characteristics:		Impedance: 50 Ω Return Loss: >18 dB 1 dB Compression Point: >10 dBm Output Muting: >75 dB (by command or sense input or by alarm condition) Connectors: SMA (female)				
Transfer Characteristics:		Max Conversion Gain: 35 dB Attenuation range: 0…20 dB, 0.1 dB steps (SBU) 0…19 dB, 1 dB steps (SBUL) Gain Variation over Temp.: ± 1 dB max Gain Flatness over Freq.: ± 1.5 dB max. over band Gain Flatness over 40 MHz: ± 0.5 dB Image Rejection: >80 dB Noise Figure: <15 dB				
Group Delay:		Ripple, Slope: < 1 ns peak-peak / 80 MHz				
Spurious Outputs:		Signal related: < -65 dBc Signal independent: < -85 dBm				
Intermodulation (3rd Order):		-53 dBc max (two CW signal input, (Δf_{in} : 5 MHz, P_{in} 2 x -33 dBm, P_{out}: 2 x -8 dBm)				
Internal frequency Stability:		± 1 x 10^{-7}, 0°C to 50°C ± 2 x 10^{-8}, 0°C to 50°C (after 30 min warm up) ± 1.5 x 10^{-9} per day (fixed temperature after 24 h warm up)				
Reference Input:		Frequency: 5 or 10 MHz sine wave (± 2 ppm) Level: 5 dBm ± 5 dBm Modes: auto Connector: BNC				
Monitoring and Control Interface (SBU only):		Protocol: SNMP Connection: UDP over Ethernet (10 or 100 Mbit/s, auto sensing), connector RJ-45				
		Protocol: HTTP (web browser interface) Connection: TCP/IP over Ethernet (10 or 100 Mbit/s, auto sensing), connector RJ-45				
		Protocol: Multipoint Connection: RS232 or RS422/RS485 (configurable), connector DSUB09 female or TCP/IP over Ethernet (10 or 100 Mbit/s, auto sensing), connector RJ-45				
Diagnostic Interface (SBUL only):		RS232, connector DSUB09 female				
Alarm Interface:		Alarm: two potential free contacts (DPDT), Connector DSUB09 female				
Temperature Range:		0°C to 50°C operating - 30°C to 80°C storage				
Relative Humidity:		< 95 % non condensing				
User Interface SBU:		LCD-Display 2 x 40 characters, 4 cursor keys, 4 function keys VFD-Display 2 x 40 characters, 4 cursor keys, 4 function keys (option: VFD				
User Interface SBUL:		Attenuator selector on front panel				
Power Input:		85…264 V AC, 40…70 Hz, appr. 15 W				
Mains Fuse:		2 x 3.15 A time-lag fuse				
Dimension and Weight:		483 x 44 x 310 mm³, 1 RU (19") appr.6 kg				

Specifications are subject to change

Order Information: **SBU-[RF Band]-[Options] or SBUL-[RF Band]-[Options]**

Possible Options are: **VFD** (VFD display, for SBU only)

Example: **SBU-Ku1** (Ku-Band 1)

L-Band Block Downconverter

C, X, Ku-Band Input, L-Band Output

SBD-Type

Key features SBD-Type

- Based on MMIC technology
- Low phase noise
- Adjustable attenuator (range: 0..20 dB, 0.1 dB step size)
- Output power +10 dBm (1dB compression point)
- Low spurious emissions
- Internal OCXO with long term stability 10-7 / year
- External reference input 5 or 10 MHz
- Local control through push buttons on front panel and display menu
- Remote control through RS232, RS422/485 (2-wire or 4-wire) interfaces, TCP/IP over Ethernet, Web browser interface, SNMP (MIBs are provided).
- Packet command syntax supports RS485 bus systems and allows addressed operation.
- Stored alarms with time stamps
- Summary alarm output (DPDT)
- Low power consumption typ. less than 15 W
- CE compliant
- **3 years warranty**

SBDL-Type

Key features SBDL-Type

- Based on MMIC technology
- Low phase noise
- Adjustable attenuator (range: 0..19 dB, 1 dB step size) through attenuator selector on front panel
- Output power +10 dBm (1dB compression point)
- Low spurious emissions
- Internal OCXO with long term stability 10-7 / year
- External reference input 5 or 10 MHz
- L-Band monitor output on front panel
- Summary alarm output (DPDT)
- RS232 diagnostic interface
- Low power consumption typ. less than 13 W
- CE compliant
- **3 years warranty**

L-Band Block Downconverter
Indoor Version

L-Band Output

Downconverter Type:		SBD/SBDL-C	**SBD/SBDL-X**	**SBD/SBDL-Ku1**	**SBD/SBDL-Ku2**	**SBD/SBDL-Ku3**
RF-Input Frequency:		C-Band 3.4 … 4.2 GHz	X-Band 7.25 … 7.75 GHz	Ku-Band 10.95 … 11.7 GHz	Ku-Band 10.7 … 11.7 GHz	Ku-Band 11.7 … 12.75 GHz
LO Frequency:		5.15 GHz	6.30 GHz	10.00 GHz	9.75 GHz	10.75 GHz
Phase Noise:	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	- 58 - 70 - 80 - 89 - 95 - 115	- 58 - 70 - 80 - 89 - 95 - 115	- 54 - 66 - 76 - 85 - 93 - 115	- 54 - 66 - 76 - 85 - 93 - 115	- 54 - 66 - 76 - 85 - 93 - 115
		max values in dBc/Hz				
IF-Output Frequency:		950 … 1750 MHz	950 … 1450 MHz	950 … 1700 MHz	950 … 1950 MHz	950 … 2000 MHz
Conversion Scheme:		frequency inversion	no frequency inversion			

Downconverter Type:		SBD2/SBDL2-Ku2Ku3 Dual Channel Converter, including one RF input with signal splitter, two IF Outputs	
RF-Input Frequency:		Ku-Band 10.70 … 11.70 GHz	Ku-Band 11.70 … 12.75 GHz
LO Frequency:		9.75 GHz	10.75 GHz
Phase Noise:	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	- 54 - 66 - 76 - 85 - 93 - 115	- 54 - 66 - 76 - 85 - 93 - 115
		max values in dBc/Hz	
IF-Output Frequency:		950 … 1950 MHz	950 … 2000 MHz
Conversion Scheme:		no frequency inversion	

RF-Input Characteristics:	Impedance: Return Loss: Maximum Aggregate Input Level: LO Leakage: RF-Connector:	50 Ω >18 dB -25 dBm (operational) + 5 dBm (damage level) -80 dBm max. SMA female
IF-Output Characteristics:	Impedance: Return Loss: 1 dB Compression Point: IF-Connectors:	50 Ω >18 dB >10 dBm SMA female
Transfer Characteristics:	Max Conversion Gain: Attenuation range: Gain Accuracy: Gain Variation over Temp.: Gain Flatness over Freq.: Gain Flatness over 40 MHz: Image Rejection: Noise Figure:	35 dB 0…20 dB, 0.1 dB steps (SBD) 0…19 dB, 1 dB steps (SBDL) ± 1.5 dB (0℃ .. 50 ℃) ± 1 dB max ± 1.5 dB max. over band ± 0.5 dB >80 dB < 11 dB
Group Delay:	Ripple, Slope:	< 1 ns peak-peak / 80 MHz
Spurious Outputs:	Signal related: Signal independent:	< -65 dBc for SBD/SBDL-Ku1 < -45 dBc for SBD/SBDL-C1 < -75 dBm
Intermodulation (3rd Order):	<-50 dBc (two CW signal input, Δf_{in} : 5 MHz, P_{in} 2 x -30 dBm, P_{out}: 2 x 5 dBm)	
Internal frequency Stability:	± 1 x 10^{-7}, 0℃ to 50℃ ± 2 x 10^{-8}, 0℃ to 50℃ (after 30 min warm up) ± 1.5 x 10^{-9} per day (fixed temperature after 24 h warm up)	
Reference Input:	Frequency: Level: Modes: Connector:	5 or 10 MHz sine wave (± 2 ppm) 5 dBm ± 5 dBm auto BNC

Specifications continued next page

L-Band Block Downconverter
Indoor Version

L-Band Output

Specifications continued:

Monitoring and Control Interface (SBU only):	Protocol: Connection:	SNMP UDP over Ethernet (10 or 100 Mbit/s, auto sensing), connector RJ-45
	Protocol: Connection:	HTTP (web browser interface) TCP/IP over Ethernet (10 or 100 Mbit/s, auto sensing), connector RJ-45
	Protocol: Connection:	Multipoint RS232 or RS422/RS485 (configurable), connector DSUB09 female or TCP/IP over Ethernet (10 or 100 Mbit/s, auto sensing), connector RJ-45
Diagnostic Interface (SBUL only):	RS232, connector DSUB09 female	
Alarm Interface:	Alarm: two potential free contacts (DPDT), Connector DSUB09 female	
Temperature Range:	0°C to 50°C operating - 30°C to 80°C storage	
Relative Humidity:	< 95 % non condensing	
User Interface SBU:	LCD-Display 2 x 40 characters, 4 cursor keys, 4 function keys VFD-Display 2 x 40 characters, 4 cursor keys, 4 function keys (option: VFD)	
User Interface SBUL:	Attenuator selector on front panel	
Power Input:	85…264 V AC, 40…70 Hz, appr. 15 W	
Mains Fuse:	2 x 3.15 A time-lag fuse	
Dimension and Weight:	483 x 44 x 310 mm³, 1 RU (19") appr.6 kg	

Specifications are subject to change

Order Information: **SBD-[RF Band]-[Options] or SBDL-[RF Band]-[Options]**

Possible Options are: **VFD** (VFD display, for SBD only)

Example: **SBD-Ku1** (Ku-Band 1)

Narrowband Block Downconverter

Indoor Version

Block Downconverter C-Band Input, L-Band Output, Fixed Gain

Downconverter Type:		BD-C	BD-X
RF-Input Frequency:		3.5…3.7 GHz	7.9…8.4 GHz
Conversion Scheme:		Single down-conversion, frequency inversion	Single down-conversion, no frequency inversion
LO Frequency:		5.154 GHz	5.75 GHz
Phase Noise:	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	- 62 dBc/Hz - 83 dBc/Hz - 89 dBc/Hz - 101 dBc/Hz - 104 dBc/Hz [1] - 111 dBc/Hz [1]	- 56 dBc/Hz - 76 dBc/Hz - 86 dBc/Hz - 96 dBc/Hz - 101 dBc/Hz [1] - 111 dBc/Hz [1]
		[1] 0°C to 50°C, outside this temperature range degraded by max 5 dB.	
RF-Input Characteristics:		Impedance: 50 Ω Return Loss: >20 dB (VSWR = 1.22) Maximum Aggregate Input Level: - 17 dBm LO Leakage: - 80 dBm max. RF-Connector: SMA female	
IF-Output Characteristics:		Frequency: 1454…1654 MHz (BD-C) 2150…2650 MHz (BD-X) Impedance: 50 Ω Return Loss: >15 dB (VSWR = 1.43) 1 dB Compression Point: >19 dBm IF-Connectors: SMA female	
Transfer Characteristics:		Conversion Gain: 35 +/-2 dB (within the operating temperature range) (BD-C) 15 +/-2 dB (within the operating temperature range) (BD-X) Level Stability: ± 0.25 dB/day (constant temperature) Amplitude Ripple: ± 0.2 dB / 20 MHz Image Rejection: >80 dB Noise Figure: <11 dB	
Group Delay (1454...1654 MHz):		Ripple, Slope: < 1 ns peak to peak / 80 MHz	
Intermodulation (3rd Order):		-60 dBc max (Δf_{in} : 5 MHz, $P_{out\ ges}$: < 3 dBm)	
AM / PM conversion:		0.1° / dB (P_{out} = 0 dBm)	
Phase Noise:	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	- 62 dBc/Hz - 83 dBc/Hz - 89 dBc/Hz - 101 dBc/Hz - 104 dBc/Hz [1] - 111 dBc/Hz [1]	[1] 0°C to 50°C, outside this temperature range degraded by max 5 dB.
Spurious Outputs:		Signal independent: < - 70 dBc < - 80 dBm	
Frequency Stability:		± 1 x 10^{-7}, 0°C to 50°C ± 2 x 10^{-8}, 0°C to 50°C (after 10 min warm up) ± 1.5 x 10^{-9} per day (fixed temperature after 24 h warm up)	
Reference Input:		Frequency: 10 MHz or 5 MHz Level: -5…10 dBm Modes: auto (senses reference input) Connector: BNC female	
Reference Output:		Frequency: 10 MHz Level: 0 ± 3 dBm Connector: BNC female	
Test Output (Microwave Oscillator):		5.154 GHz -7 ± 3 dBm SMA female	
Temperature Range:		0°C to 50°C operating - 30°C to 80°C storage	
Relative Humidity:		< 95 % non condensing	
Power Supply:		85…264 V AC, 40…70 Hz	
Power Consumption:		Max: 19 VA / 13 W Typ: 16 VA / 10 W	
Mains Fuse:		1.6 A time-lag fuse	
Dimension and Weight:		483 x 44 x 323 mm³, 1 RU (19") (maximum dimension) 436 x 44 x 280 mm³ (dimension without front panel) appr. 3 kg	

Specifications are subject to change

Order Information: **BD-C**

BD-X