Invacom 3.5W
Ku Band VSAT Transmitter
TUL-351, 352, 353

- **Broadband Via Satellite**
- **SCPC**
- **Data, Voice or Video**
- **Co-Polar Transmit / Receive**
- **Cross Polar Transmit / Rx**
- **Excellent gain stability via digital loop**
- **Constant level option via internal ALC**
- **N or F connector**
- **CE, Eutelsat and worldwide type approvals.**

The Invacom range of transmitters are designed for the ultimate in system flexibility. Use with the relevant Invacom LNB for either high stability SCPC (PLL LNB) or low receive stability broadband internet via satellite. Configure the system for either co-polar (transmit and receive on the same polarity) or cross polar (transmit and receive on opposite polarities) by using the relevant Invacom OMT.

Designed to DVB-RCS specifications they offer easy connectivity with most data receivers and hubs.

Constant gain or constant output level transmitters are both available.

As constant gain, an internal temperature sensor monitors the temperature and keeps the gain constant over the transmitter's operating temperature range.

As constant level, an internal burst gated ALC circuit detects the output level and adjusts the gain to keep the output at the rated power, regardless of input level or frequency. This makes for quick simple installation of the satellite system.

Additional advanced features and remote control functions are available using DiSEqC commands (see sheet 2 for a description of the options)

All units incorporate advanced microprocessor monitoring and control that will prevent transmission if the 10 MHz reference is lost, the power supply is below voltage or the transmitter is above the specified maximum temperature.

Features Versus Model Number

Transmitter Function	TUL-351	TUL-352	TUL-353	TUL-354
Constant Gain (Note 1)			✓	✓
Constant Power (Note 2)	✓	✓		
Dumb (no DiSEqC control) (Note 3)		✓		✓
DiSEqC control between IDU - ODU (Note 4)	✓		✓	
Mutes between bursts—optional (note 5)	✓	✓	✓	✓
Serial number and software version (Note 6)	✓		✓	
Password protect (Note 7)	✓		✓	
Adjust constant level power (Note 8)	✓			
Turn off if no 10 MHz reference (Note 9)	✓	✓	✓	✓
Turn off if over or under voltage (Note 10)	✓	✓	✓	✓
Turn off power amplifier (Note 11)	✓		✓	
High Temperature Shutdown (Note 12)	✓	✓	✓	✓

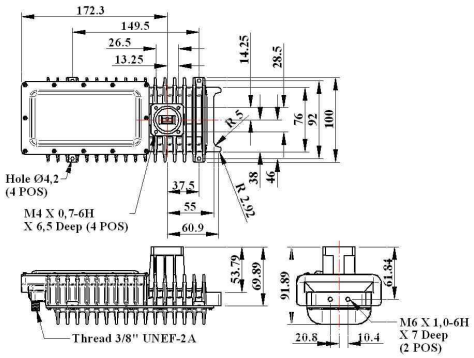
Notes

1. **Constant Gain**. This is the classic VSAT BUC, where the output level (at 14 GHz) is approximately 55dB greater than the L band input level. The Invacom BUC uses an internal temperature detector and gain-adjust circuitry to ensure the gain stays constant over temperature.
2. **Constant Power**. The BUC is self-levelling, such that the output level will remain constant as the input level varies. A 2W BUC will transmit a constant 2W regardless of frequency, temperature or input level. This ensures compliance with a 2W-class licence – something that a constant gain transmitter is unable to guarantee. See note 8 to fine adjust this output level.
3. **Dumb BUC**. No control signals are required between the ODU and IDU. Supply the ODU with d.c. a 10 MHz reference and an IF input signal and it will transmit at 14-14.5 GHz.
4. **DiSEqC Interface**. Match the BUC to a suitable DiSEqC enabled IDU and many advanced control and monitoring features can be accessed, via DiSEqC.
5. **Auto Muting**. The transmitter will mute when there is no IF signal detected at the input. This prevents the transmitter from transmitting noise when there is no input signal. (optional)
6. **Serial number and firmware version**. Readable via the DiSEqC interface.
7. **Password Protect**. To prevent inadvertent tampering with the ODU, the unit will only transmit after receiving the correct DiSEqC password.
8. **Adjust constant level power**. Uses DiSEqC to trim the output level of a constant power unit by up to 5dB. Used in initial system set-up to balance the power across the satellite beam.
9. **Turn off if no 10 MHz reference**. The unit will turn off if a 10 MHz reference is unavailable within the specified range. This prevents the unit transmitting at the wrong frequency.
10. **Turn off if over or under voltage**. The unit will turn off if the d.c. voltage is outside the specified range. This prevents unspecified transmissions.
11. **Turn off PA**. A DiSEqC command will turn off the PA, so conserving power.
12. **High Temperature Shut-down**. Turns off the unit if the temperature exceeds 85C.

3.5W Ku Band VSAT Transmitter

Models TUL - 351, 352, 353, 354

February 2005



1	**IF Input Frequency Range**	950 –1450 MHz
2	**Operating Input Level Range**	
	Min	-30dBm
	Max	5dBm
3	**IF Connector**	
	Type	Female F-Type
	Impedance	75ohm
	Option:	N-Type connector 50 ohm
4	**IF Input Return Loss**	
	Min	10dB
5	**Output Frequency**	14.0 - 14.5 GHz
6	**Local Oscillator Frequency**	13.05GHz
7	**Local Oscillator Phase Noise (max)**	
	1kHz	-69 dBc/Hz
	10kHz	-75 dBc/Hz
	100kHz	-91dBc/Hz
8	**Adjacent Channel Power at +34.5dBm output**	-26dBc
9	**Power Output @ 1dB Gain Compression Levelled**	
	351/2/3/4	35.4dBm
10	**Output Stability Over Temperature Range**	
	Type TUL-351 & TUL-352	+/-0.5dB typ
	Type TUL-353 & TUL-354	+/- 2dB
11	**Power Output Suppression When Muted**	
	Min	30dB
12	**Noise Density in 14-14.5GHz Band**	
	Max	-122dBW/Hz

3	**Noise Density in 10.7-12.75GHz Band**	
	Max	-160dBm/Hz
14	**LO Leakage**	
	Max	-60dBm
15	**Spurious in RX Band**	
	Max	-80dBm
16	**Spurious in TX Band**	
	Excluding carrier side bands	-60dBc
	Sidebands 10 MHz or less from carrier	-50dBc
17	**Output Port**	WG17/WR75
18	**Output Return Loss**	
	Min	10dB
19	**Supply Voltage Fed by IF Coax**	
	Min	15V
	Max	30V
20	**Power Consumption**	
	351/2/3/4	24W
21	**External Frequency Reference 10MHz Input Level**	
	Min	-10dBm
	Max	**+**5dBm
22	**Control and Communication**	
	See page 2 for the different options	
23	**Operating Temperature**	
	Min	-30° C
	Max	+60° C
24	**Weight**	1.3Kg