

# 600mA LNB-Power Supply & Control Voltage Regulator

## FEATURES

- Low noise output to avoid sensitivity of Can Tuner and DISH's LNA dropping down
- Noise < +/-50mV@350MHz BWL,
- Noise < +/-35mV@20MHz BWL
- Single chip solution on 700mVpp 22KHz EXT<sub>M</sub> with 10μs Trise/Tfall for less Transferring noise
- LNB Voltages (2 levels: 14V and 19V) compatible with common standards, Push-pull output stage minimizes 14→19V and 19V→14V output transition times;
- External 22KHz EXT<sub>M</sub> input;
- Integrated DC/DC BOOST converter and high efficiency (typ. 90%) with integrated Power Mos-FET
- 1.0MHz Switch Frequency BOOST
- Integrated low Noise Linear Regulator
- 5.0V, 3.3V, 2.5V, 1.8V, logic compatible
- Internal Short, OCP,OTP, protection
- ESOP8L package

## APPLICATIONS

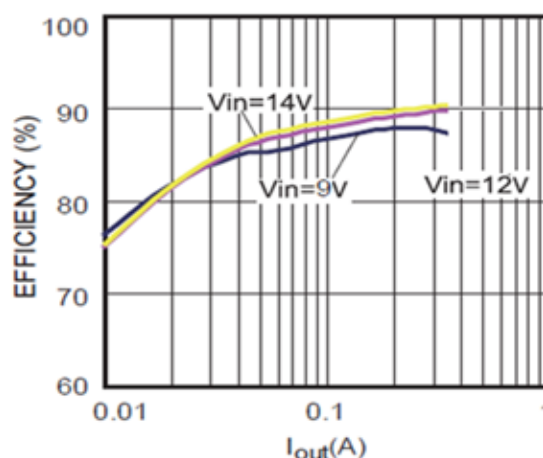
- LNB Power supply for DVB-S/S2/ABS
- Digital STB
- Satellite TV cards

## GENERAL DESCRIPTION

Intended for analog and digital satellite receivers/sat-TV, sat-OC cards, the STI8035 is a monolithic voltage regulator and interface IC, packaged in eSOP8EL, specifically designed to provide the 14/19V power supply with high efficiency and the 22kHz EXT<sub>M</sub> signaling to the LNB down-converter in the antenna dish or to the multi-switch box. STI8035 consists of a BOOST converter and a low-noise linear regulator along with the circuitry required for EXT<sub>M</sub> injection and pin controllable interface. The device makes the total LNB supply design simple, efficient and compact with low external component count

The external modulation input (EXT<sub>M</sub> pin) can accept a tone modulated DiSEqC command and transfer it symmetrically to the output to meet DiSEqC 1.x protocol

## EFFICIENCY



## APPLICATIONS

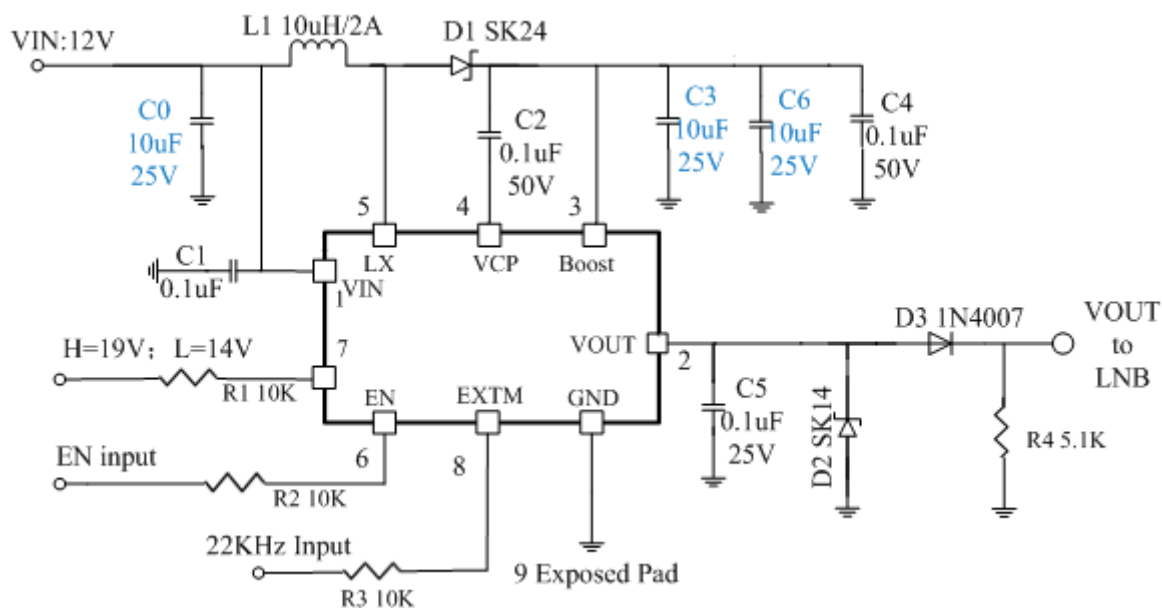
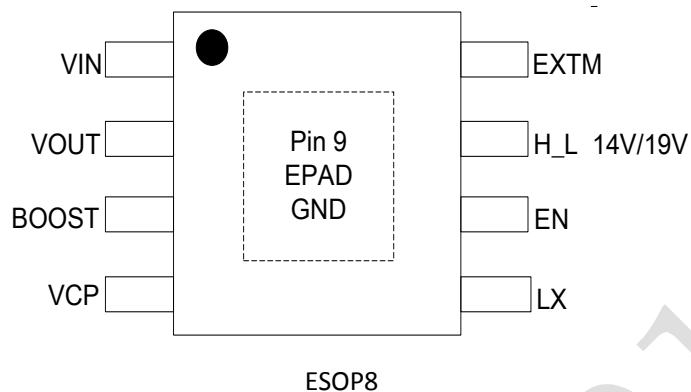


Figure 1. Basic Application Circuit

## ABSOLUTE MAXIMUM RATINGS (Note 1)

Parameter	Value	Unit
$V_{IN}$ , EN Supply Voltage Range	-0.3~35	V
BOOST Voltage Range	-0.3~27	
$V_{OUT}$ Voltages Range	-0.3~27	V
LX Voltage Range	-2~35	V
H/L, TON_IN Voltage Range	-0.3~5.5	V
Junction Temperature	-40~150	°C
Storage Temperature	-50~150	°C
Lead Temperature(Soldering, 10s)	260	°C

## PACKAGE/ORDER INFORMATION



**Top Mark: S8035YY XXX (S8035: Device Code, YY XXX: Inside Code)**

Part Number	Package	Top mark	Quantity/ Reel
STI8035	ESOP8	S8035YYXXX	3000

## PIN FUNCTIONS

Pin	Name	Function
1	VIN	Power Supply input
2	VOUT	Output voltage for the LNB
3	BOOST	BOOST converter output voltage sense, and internal LDO's input terminal
4	VCP	Charge Pump for LDO supply
5	LX	DC-DC converter switch node connection, connects to inductor
6	EN	When this pin is low, the output is disabled. Setting EN = 1 enables the output voltage
7	H_L	Output Voltage set input pin, high:19V, Low:14V
8	EXTM	22KHz EXTM signal input pin
9	GND	Power Ground (Exposed pad)

## ESD RATING

Items	Description	Value	Unit
V <sub>ESD</sub>	Human Body Model for all pins	±2000	V

**JEDEC specification JS-001**

## RECOMMENDED OPERATING CONDITIONS

Items	Description	Min	Max	Unit
Voltage Range	IN	9	14	V
TA	Operating Temperature Range	-40	85	°C

## ELECTRICAL CHARACTERISTICS (Note 3)

Over operating free-air temperature range(unless otherwise noted)  $V_{IN}=12V$ ,  $T_A=25^{\circ}C$ 

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Supply Voltage</b>						
Operating supply voltage range	$V_{IN}$		9	12	14	V
Input Under Voltage Lockout Threshold	$V_{UVLO}$	Vin rising		8		V
Input Under Voltage Lockout Threshold Hysteresis	$V_{UVLO\_HY}$			0.3		V
Operating supply current	$I_{IN}$	EN="1", VOUT=19V, EXT <sub>M_IN</sub> =0V		9		mA
		EN="1", VOUT=19V, 22KHz EXT <sub>M</sub> Input		24		mA
Disable Supply Current	$I_{SDN}$	EN="0"		1.6		mA
<b>Output Voltage</b>						
Output Voltage	$V_{OUT}$	EN="1", H <sub>L</sub> ="1" ILOAD=200mA	18.0		19.0	V
		EN="1", H <sub>L</sub> ="0" ILOAD=200mA	13.0		14.0	V
Linear Regulator Drop Voltage	$V_{DROP}$	EN="1", ILOAD=450mA	0.6		1.2	V
VIN Line Regulation	$R_{LINE}$	VIN=9~14V, VOUT=19V		4	40	mV
VOUT output load regulation	$R_{LOAD}$	Iload=0~450mA, VOUT=19V Slow Rate=255mA/us, CLOAD=0.2uF		30	50	mV
Ripple and noise on VOUT output	$V_{NOISE}$	20MHz BWL			30	mV
		350MHz BWL			50	mV
Output Current limit	$I_{LIMIT}$	VOUT=19V or VOUT=14V		600		mA
		VOUT output short		110		mA

<b>BOOST DC/DC</b>						
Boost DC/DC Switching Frequency	$F_{BOOST}$	EN="1"	0.8	1	1.2	MHz
Switch On Resistance	$R_{son}$	ILOAD=450mA		120		mΩ
BOOST Maximum Duty	$D_{BST\_MAX}$			80		%
BOOST Minimum On time	$D_{BST\_MIN}$			0		%
BOOST Current Limit	$I_{BST\_LIM}$			1.5		A
<b>Short and Overload Protection</b>						
Dynamic Overload ON time	$T_{on}$	Output shorted to GND		75		mS
Dynamic Overload OFF time	$T_{off}$	Output shorted to GND		2000		mS
Thermal Shutdown Threshold	$T_{SDN}$			160		°C
Thermal Shutdown Hysteresis	$T_{SDN\_HY}$			25		°C
<b>EXTM</b>						
Input EXTM Frequency Range	$F_{EXTM}$		20	22		KHz
VOUT Output EXTM Amplitude, peak to peak	$V_{PP\_EXTM}$	ILOAD=0~450mA, CLOAD=100nF	600	700	800	mV
VOUT output EXTM Duty	$D_{EXTM}$	ILOAD=0~450mA, CLOAD=570nF		50		%
VOUT output EXTM Rising Time	$T_{RISE\_TON}$	ILOAD=0~450mA, CLOAD=570nF	7.5	10	12.5	uS
VOUT output EXTM Rising Time	$T_{FALL\_TON}$	ILOAD=0~450mA, CLOAD=570nF	7.5	10	12.5	uS
EXTM Pin Input Leakage Current	$I_{TON\_LEAK}$	Pull down 2M RES	-3		3	uA
<b>H_L</b>						
H_L High Logic Input	$V_{HL\_INH}$		0.95			V
H_L Low Logic Input	$V_{HL\_INL}$				0.55	V
H_L Pin Input Leakage	$I_{HL\_LEAK}$	Input=1.2V Pull down 2M RES	-3		3	uA
<b>EN</b>						
EN High Logic Input	$V_{EN\_INH}$		0.95			V
EN Low Logic Input	$V_{EN\_INL}$				0.55	V
EN PIN Maximum Input Current	$I_{EN\_MAX}$				10	uA

**Note 1: Absolute Maximum Ratings** are those values beyond which the life of a device may be impaired.

**Note 2:**  $T_J$  is calculated from the ambient temperature  $T_A$  and power dissipation  $P_D$  according to the following formula:  $T_J = T_A + (P_D) \times (250^\circ\text{C/W})$ .

**Note 3:** 100% production test at  $+25^\circ\text{C}$ . Specifications over the temperature range are guaranteed by design and characterization.

**Note 4:** Dynamic supply current is higher due to the gate charge being delivered at the switching frequency

## OPERATION

The STI8035 single output LNB supply utilizes built-in DC/DC step-up converters, which operate from 9V to 14V and outputs the low noise voltage set by H-L pin, and accepts a tone modulated DiSEqC command and transfers it symmetrically to the output to meet DiSEqC 1.x protocol.

### DiSEqC Encoding

The EXTM accepts an externally modulated EXTM command and in turn modulates the VOUT symmetrically to meet the DiSEqC 1.x and with few more external components to meet DiSEqC 2.0 transmit protocol. Burst coding of the EXTM can be accomplished due to the fast response of the EXTM pin.

### Linear Regulator

The output linear regulator is designed to source 500mA continuous current and 650mA peak. In order to minimize the power dissipation, the output voltage of the internal step-up converter is adjusted to allow the linear regulator to work at a minimum dropout of 1 V typical (Load current = 500mA) between the BOOST and VOUT pin. The BOOST pin is capable of withstanding a back voltage of 27V.

### Short and Over Load Protection

When the LDO current exceeds the preset over current threshold for a period of 65ms, the device enters a  $T_{ON} = 65\text{ms}/T_{OFF} = 500\text{ms}$  routine. The device returns to normal operation after a successful soft-start cycle

This IC is protected against overheating. When the junction temperature exceeds  $+160^\circ\text{C}$  (typical), the step-up converter and the linear regulator are shut-off. When the junction is cooled down to  $+135^\circ\text{C}$  (typical), normal operation is resumed.

### EXTM input

Once EN is pulled high, after a 50ms delay before applying 22kHz, 50% square pulse on EXTM it generates the DISEQ EXTM ( $\pm 350\text{mV}$ ) on the output VOUT.

## FUNCTIONAL BLOCK DIAGRAM

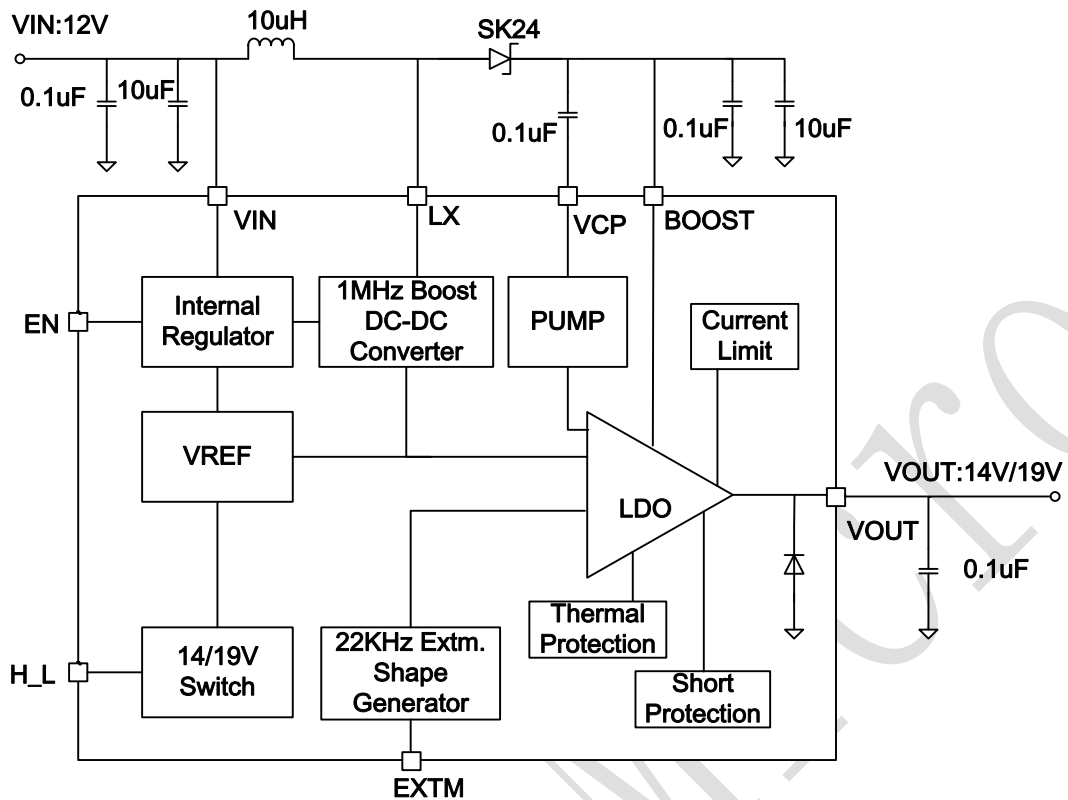
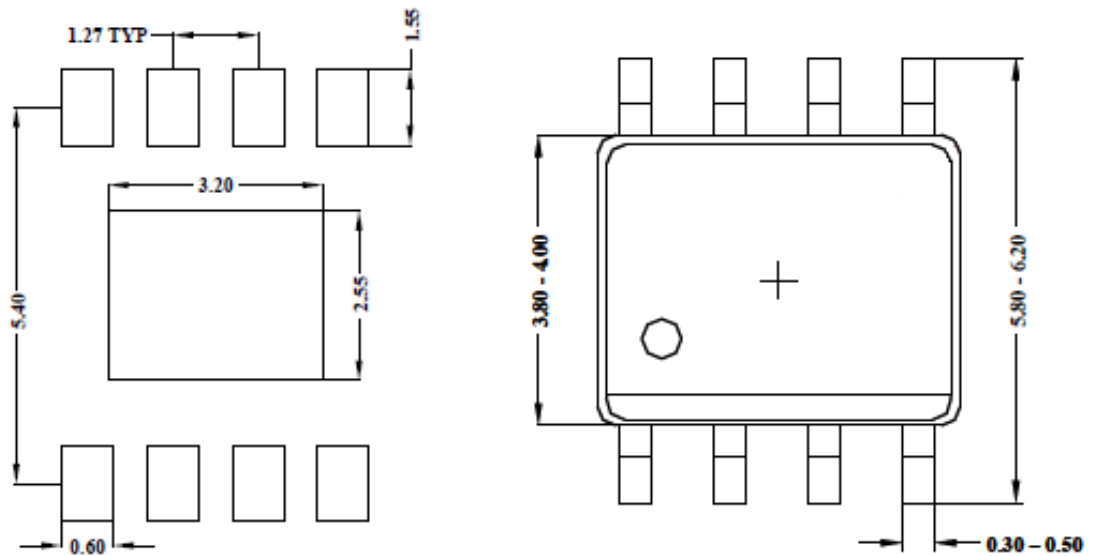
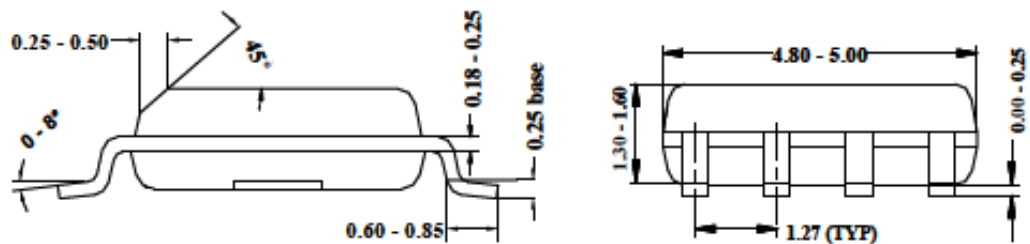


Figure 2. STI8035 Block Diagram

## PACKAGE INFORMATION



Recommended Pad Layout



ESOP8

### Note:

- 1) All dimensions are in millimeters.
- 2) Package length does not include mold flash, protrusion or gate burr.
- 3) Package width does not include inter lead flash or protrusion.
- 4) Lead popularity (bottom of leads after forming) shall be 0.10 millimeters max.
- 5) Pin 1 is lower left pin when reading top mark from left to right.