500mA LNB-Power Supply & Control Voltage Regulator

FEATURES

- High Efficiency: Up to 90%
- 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 EXTM 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 EXTM input;
- Integrated DC/DC BOOST converter and high efficiency (typ. 87%) 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

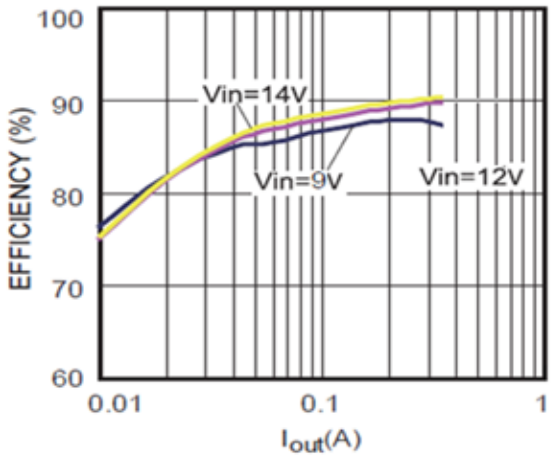
- LNB Power supply for DVB-S/S2/ABS
- Digital STB
- Satellite TV cards

GENERAL DESCRIPTION

Intended for analog and digital satellite receivers/sat-TV, sat-OC cards, the STI8036 is a monolithic voltage regulator and interface IC, packaged in ESOP8L, specifically designed to provide the 14/19V power supply with high efficiency and the 22kHz TONE signaling to the LNB down-converter in the antenna dish or to the multi-switch box.STI8036 consists of a BOOST converter and a low-noise linear regulator along with the circuitry required for TONE 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 (TONE pin) can accept a tome modulated DiSEqC command and transfer it symmetrically to the output to meet DiSEqC 1.x protocol

EFFICIENCY



APPLICATIONS

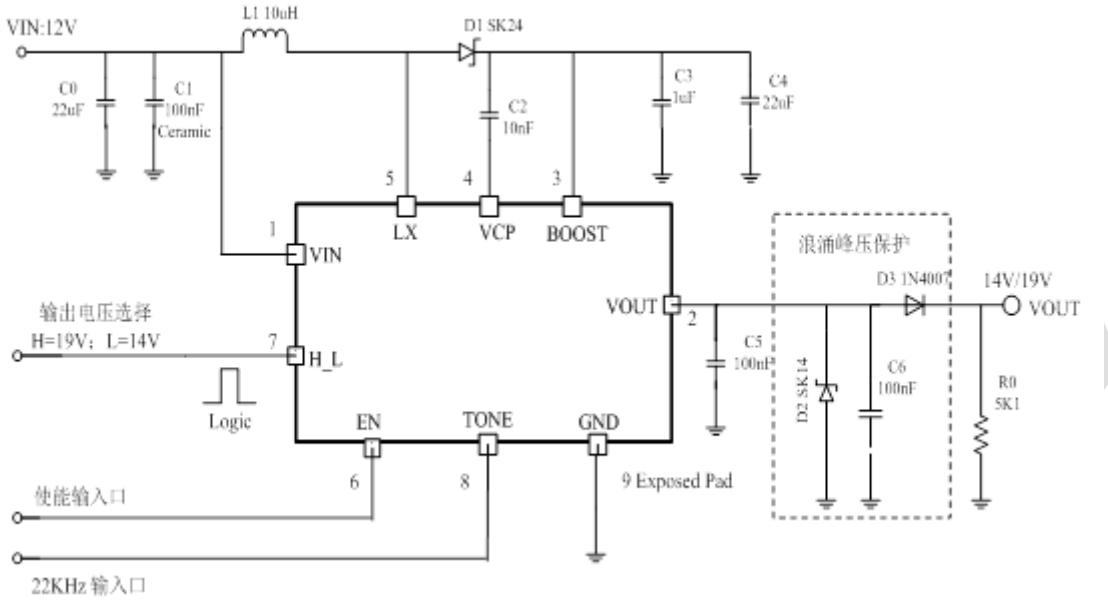
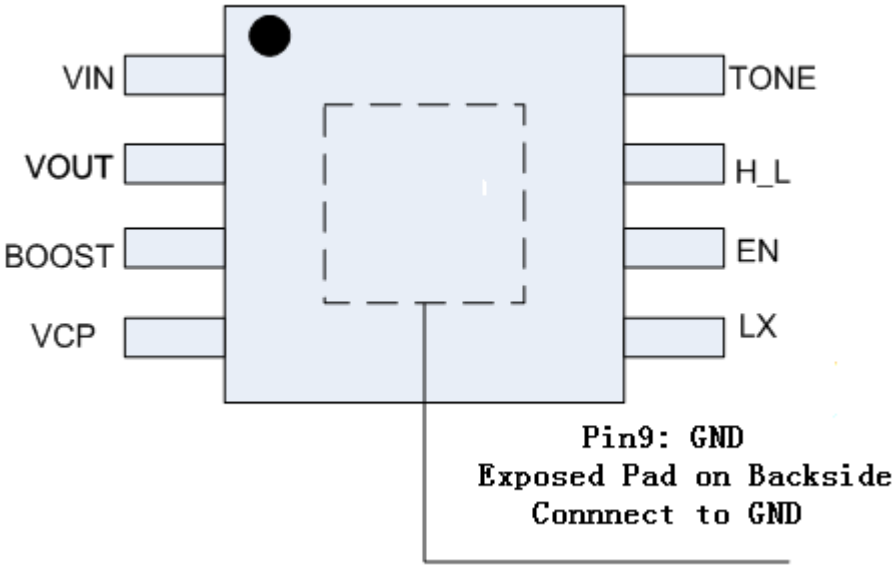


Figure 1. Basic Application Circuit

ABSOLUTE MAXIMUM RATINGS (Note 1)

Parameter	Value	Unit
V_{IN},EN Supply Voltage Range	-0.3~24	V
BOOST Voltage Range	-0.3~30	V
V_{OUT} Voltages Range	-0.3~24	V
LX Voltage Range	-2~30	V
VCP Voltage Range	-0.3~30	V
H/L,TON_IN Voltage Range	-0.3~6	V
Junction Temperature	-40~150	°C
Storage Temperature	-50~150	°C
Lead Temperature(Soldering,10s)	260	°C

PACKAGE/ORDER INFORMATION



ESOP8

Top Mark: S8036YY XXX (S8036: Device Code, YY XXX: Inside Code)

Part Number	Package	Top mark	Quantity/ Reel
STI8036	ESOP8	S8036YY XXX	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_{ESD}	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	℃

ELECTRICAL CHARACTERISTICS (Note 3)

Over operating free-air temperature range(unless otherwise noted) V_{IN}=12V，TA=25℃

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage						
Operating supply voltage range	V_{IN}		9	12	14	V
Input Under Voltage Lockout Threshold	V_{UVLO}	Vin rising		7.5		V
Input Under Voltage Lockout Threshold Hysteresis	V_{UVLO_HY}			0.6		V
Operating supply current	I_{IN}	EN="1",VOUT=19V, EXTM_IN=0V		10		mA
		EN="1",VOUT=19V, 22KHz EXTM Input		25		mA
Disable Supply Current	I_{SDN}	EN="0"		0.2		mA
Output Voltage						
Output Voltage	V_{OUT}	EN="1", H_L="1" ILOAD=200mA	18.0		19.0	V
		EN="1", H_L="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
DC Control Switching Transitions	TDCTRAN	14V->19V ILOAD=200mA		1		ms
		19V->14V ILOAD=200mA		1		ms

PoweronVout Rise Time	TRVOUT	ILOAD=200mA		1.5		ms
VOUT output load regulation	R_{LOAD}	Iload=0~450mA, VOUT=19V Slow Rate=255mA/us, CLOAD=0.2uF		30	80	mV
Ripple and noise on VOUT output	V_{NOISE}	20MHz BWL			35	mV
		350MHz BWL			70	mV
Output Current limit	I_{LIMIT}	VOUT=19V or VOUT=14V		600		mA
		VOUT output short		240		mA
BOOST DC/DC						
Bost DC/DC Switching Frequency	F_{BOOST}	EN="1"	0.8	1	1.2	MHz
Switch On Resistance	Rson	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
Short and Overload Protection						
Dynamic Overload ON time	Ton	Output shorted to GND		75		mS
Dynamic Overload OFF time	Toff	Output shorted to GND		1600		mS
Thermal Shutdown Threshold	T_{SDN}			150		℃
Thermal Shutdown Hysteresis	T_{SDN_HY}			25		℃
EXTM						
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	6	8	10	uS
VOUT output EXTM Rising Time	T_{FALL_TON}	ILOAD=0~450mA, CLOAD=570nF	6	8	10	uS
EXTM Pin Input Leakage Current	I_{TON_LEAK}	Pull down 2M RES			5	uA
H_L						

H_L High Logic Input	V_{HL_INH}		1			V
H_L Low Logic Input	V_{HL_INL}				0.55	V
H_L Pin Input Leakage	I_{HL_LEAK}	Input=1.2V Pull down2M RES			3	uA
EN						
EN High Logic Input	V_{EN_INH}		1			V
EN Low Logic Input	V_{EN_INL}				0.55	V
EN PIN Maximum Input Current	I_{EN_MAX}				15	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: $T_J = T_A + (P_D) \times (250°C/W)$.

Note 3: 100% production test at +25°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 STI8036 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 tome modulated DiSEqC command and transfers it symmetrically to the output to meet DiSEqC 1.x protocol.

DiSEqC Encoding

The TONE accepts an externally modulated TONE 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 TONE can be accomplished due to the fast response of the TONE 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 TON = 75ms/TOFF = 1600ms routine. The device returns to normal operation after a successful soft-start cycle

This IC is protected against overheating. When the junction temperature exceeds +150°C (typical), the step-up converter and the linear regulator are shut-off. When the junction is cooled down to +125°C (typical), normal operation is resumed.

TONE input

Once EN is pulled high, after a 50ms delay before applying 22kHz, 50% square pulse on TONE in generates the DISEQ TONE (+/-350mV) on the output VOUT.

FUNCTIONAL BLOCK DIAGRAM

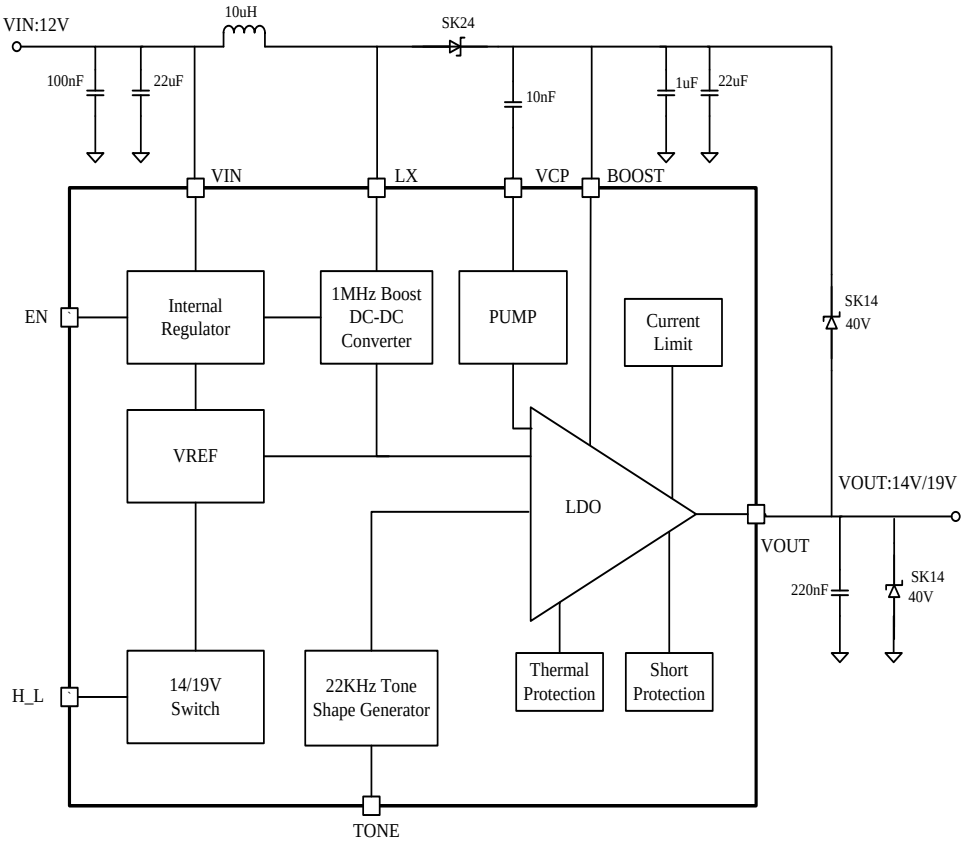
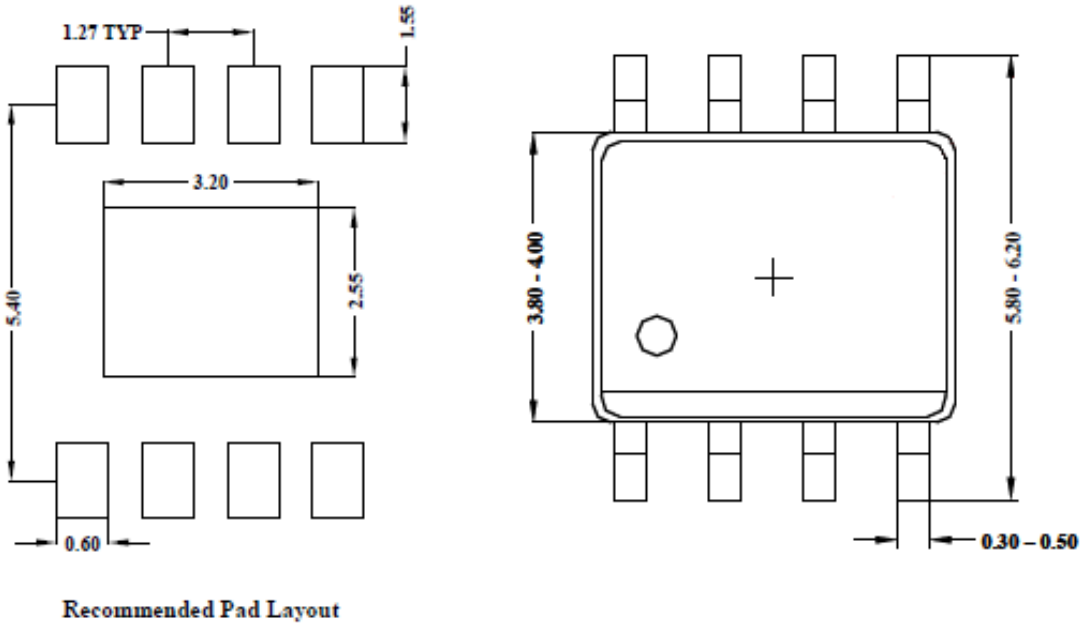
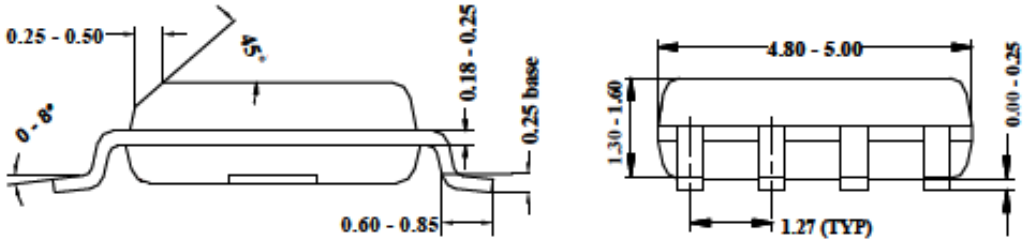


Figure 2. STI8036 Block Diagram

PACKAGE INFORMATION



Recommended Pad Layout



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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.