



NXP GreenChip flyback controllers TEA173x

Bring high efficiency and low standby power to low-cost applications

Optimized for applications requiring up to 75 W, these cost-effective devices deliver 90% efficiency, use <100 mW of power, and enable slim, compact designs.

Key features (TEA1733, TEA1738)

- ▶ SMPS controller IC enabling low-cost applications
- ▶ Large input voltage range (12 to 30 V)
- ▶ Very low supply current during start-up and restart (10 μ A typ)
- ▶ Low supply current during normal operation (0.5 mA typ without load)
- ▶ Overpower or high/low line compensation
- ▶ Adjustable overpower time-out & restart timer
- ▶ Reduced EMI
- ▶ High efficiency at low output power levels
- ▶ Slope compensation for CCM operation
- ▶ Low and adjustable OverCurrent Protection (OCP) trip level
- ▶ Adjustable soft start operation
- ▶ Two protection inputs (e.g. for input UVP and OVP, OTP and output OVP)
- ▶ Over-temperature protection
- ▶ Low-cost, industry-standard packages

Additional features (TEA1738)

- ▶ Higher efficiency at medium and low loads
- ▶ Higher frequency at overpower
- ▶ V_{CC} over-voltage protection
- ▶ Pin-for-pin compatible with TEA1733 in SO8 package

Applications

- ▶ Adapters for notebooks, netbooks, printers
- ▶ LCD monitors
- ▶ DCM and CCM power supplies

NXP's GreenChip TEA1733 and TEA1738 devices combine fixed-frequency operation at high output power with frequency reduction at low output power. The result is high efficiency over the total load range. Frequency jitter reduces electromagnetic interference (EMI), and both ICs are equipped with several protections to enhance robustness and reliability.

The standard versions of the TEA1733 and TEA1738 operate at 67 kHz and cause safe restart for over-power time-outs. The TEA1733L and TEA1738L versions trigger latched protection for over-power time-outs. The TEA1733 is also available in derivatives that operate at 90 kHz: the TEA1733A includes safe restart, the TEA1733M offers latched protection.

All the TEA1733 and TEA1738 variants are produced in NXP's ABCD silicon-on-insulator (SoI) technology. As a result, the devices offer high-speed protection, are insensitive to latch-up, and are less dependent on temperature.



Signal interference is also lower, and a wider V_{CC} range is possible.

For both devices, during startup, the supply voltage V_{CC} is charged by the current through a start-up resistor. Since the current consumption of the IC is roughly 10 μA (typ) at startup, there's no need for high-voltage circuitry.

Low current consumption and frequency reduction means that a standby power of less than 100 mW is possible. With the right external resistors and X-cap, the measured standby power can be as low as 48 mW at 115 Vac and 84 mW at 230 Vac for a typical 65 W, 19.5 V power supply.

Both devices offer a number of protection features, including input and output over/under-voltage protection, over-power protection, and internal/external over-temperature protection. The devices are adjustable for over-power time-out, and the support high/low line compensation.

TEA1733(L) vs. TEA1738(L)

Designed as a drop-in replacement for the TEA1733(L), the TEA1738(L) uses the same low-cost, industry-standard SO8 package and has the same pinning, but delivers even higher efficiency.

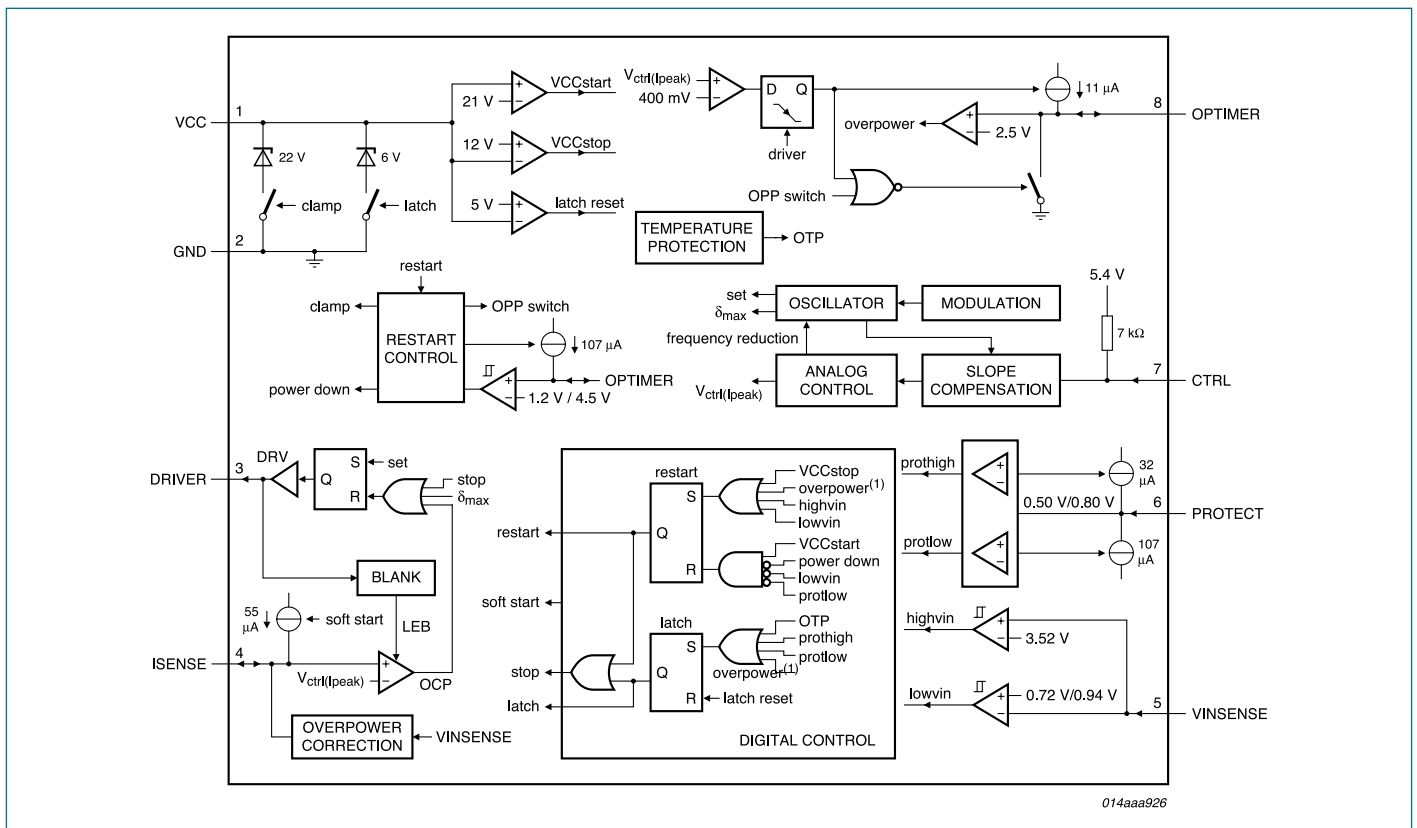
The TEA1738(L) uses a lower frequency at medium loads to obtain higher efficiency at medium and low loads. It uses a higher frequency during overpower conditions to obtain a temporary increase in output power. The frequency reduction slope (Vco mode) has been changed to prevent audible noise and achieve the lowest possible standby power. The VINSENSE high-protection function has been removed, to reduce reset time after an overvoltage condition. The maximum duty cycle has been increased, to support larger dips in mains voltage. Over-voltage protection has been added to the V_{CC} line, to improve the accuracy of internal protection.

In the L version, which offers latched protection, there are new techniques for preventing false OPP triggering and for preventing latched protection reset due to premature V_{CC} UVLO. Note that replacing the TEA1733(L) with the TEA1738(L) may impact EMI and protection behavior. An application check is recommended before finalizing any replacements.

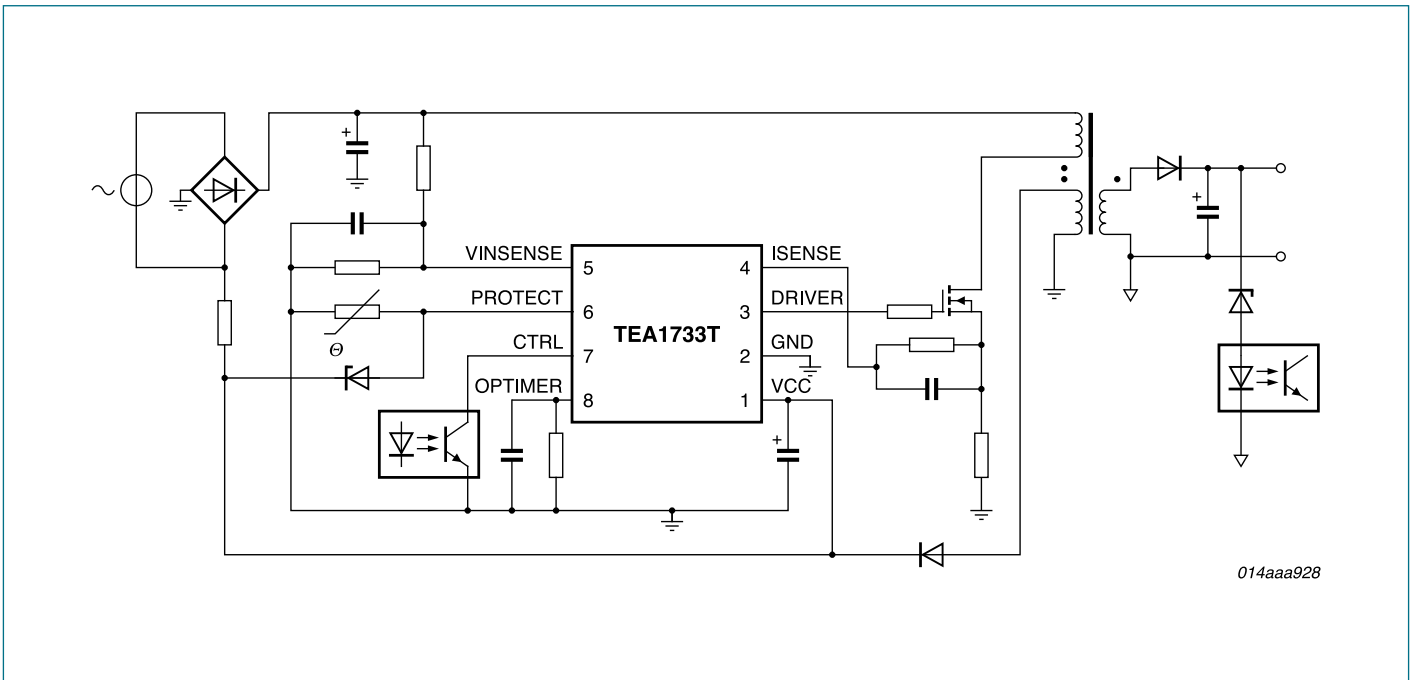
Adapter demo board

The NXP demo board UM10385 gives an example of a 65 W notebook adapter. The TEA1733 helps the system achieve an EnergySTAR average efficiency of roughly 90% at 115 and 230 Vac. The board also features extremely low power consumption at no load (115 V = <60 mW at no load, 230 V = <100 mW at no load).

TEA1733 block diagram



TEA1738 application diagram



TEA173x versions

Parameter	TEA1733	TEA1733L	TEA1733A	TEA1733M
	TEA1738	TEA1738L		
Safe restart protection	Yes		Yes	
Latched protection		Yes		Yes
SO8 package	Yes	Yes	Yes	Yes
DIP8 package		Yes (TEA1733L only)		
Operating frequency	67 kHz	67 kHz	90 kHz	90 kHz

TEA173x protection parameters

Parameter Protection	TEA1733	TEA1733L	TEA1733A	TEA1733M	TEA1738	TEA1738L
OCB (Over Current Protection, primary side)	Cycle by Cycle	Cycle by Cycle	Cycle by Cycle	Cycle by Cycle	Cycle by Cycle	Cycle by Cycle
OVP (Over Voltage Protection, supply pin V _{cc})	external	external	external	external	integrated	integrated
pin PROTECT, level > V _{high} (PROTECT) (typ. 0.8 V)	Latched	Latched	Latched	Latched	Latched	Latched
pin PROTECT, level < V _{low} (PROTECT) (typ. 0.5 V)	Latched	Latched	Latched	Latched	Latched	Latched
pin OPTIMER, VOPTIMER (prot) voltage > 2.5 V (typ.)	Safe Restart	Latched	Safe Restart	Latched	Safe Restart	Latched
IC Over Temperature Protection (OTP)	Latched	Latched	Latched	Latched	Latched	Latched
pin VINSENSE, level < V _{low} (VINSENSE) (typ. 0.69 V)	Safe Restart	Safe Restart	Safe Restart	Safe Restart	Safe Restart	Safe Restart
pin VINSENSE, level > V _{high} (VINSENSE) (typ. 3.5 V)	Safe Restart	Safe Restart	Safe Restart	Safe Restart	Not Implemented	Not Implemented



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Date of release: February 2011

Document order number: 9397 750 17052

Printed in the Netherlands