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NTE7223
Integrated Circuit
Step–Down Switching Voltage Regultor
Adjustable Output

Description:

The NTE7223 regulator is a monolithic integrated circuit in a 5–Lead TO220 type package that provides all the active functions for a step–down (buck) switching regulator, capable of driving a 3A load with excellent line and load regulation. This device offers a high–efficiency replacement for popular three–terminal linear regulators and substantially reduces the size of the heat sink and in some cases, no heat sink is required.

Features:

- Adjustable Output: V_{OUT} = 1.23V to 37V
- Guaranteed 3A Output Current
- 52kHz Fixed Frequency Internal Oscillator
- TTL Shutdown Capability, Low Power Standby Mode
- High Efficiency
- Thermal Shutdown and Current Limit Protection

Applications:

- Simple High–Efficiency Step–Down (Buck) Regulator
- Efficient Pre–Regulator for Linear Regulators
- On–Card Switching Regulator
- Positive to Negative Converter (Buck–Boost)

Absolute Maximum Ratings: (Note 1)

Maximum Supply Voltage 45V
$\overline{ON}$/OFF Pin Input Voltage . . . . . $-0.3V \le V \le +V_{IN}$
Output Voltage to GND (Steady State) . . . . . –1V
Power Dissipation . . . . . Internally Limited
Maximum Junction Temperature . . . . . +150°C
Storage Temperature Range . . . . . –65° to +150°C
Minimum ESD Rating (C = 100pF, R = 1.5kΩ) 2kV
Lead Temperature (During Soldering, 10 sec Max) . . . . . +260°C
Typical Thermal Resistance, Junction–to–Ambient (Mounted Vertically, No External Heat Sink)
1/2” leads in a socket or PC mounted with minimum copper area . . . . . 65°C/W
1/4” leads soldered to a PC board containing approx 4 square inches of copper . . 45°C/W
Typical Thermal Resistance, Junction–to–Case . . . . . 2°C/W

Note 1. Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics.

Operating Ratings:

Supply Voltage 40V

Temperature Range . . . . . $-40° \le T_J \le +125°C$

Electrical Characteristics: (V_{IN} = 12V, I_{LOAD} = 500mA, T_J = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Output Voltage	V_{OUT}	V_{OUT} = 5V		1.217	1.23	1.243	V
		0.5A ≤ I_{LOAD} ≤ 3A, 8V ≤ V_{IN} ≤ 40V, V_{OUT} = 5V		1.193	1.23	1.267	V
			T_J = −40° to +125°C	1.18	1.23	1.28	V
Efficiency	η	V_{IN} = 12V, I_{LOAD} = 3A, V_{OUT} = 5V		–	77	–	%
Feedback Bias Current	I_b	V_{OUT} = 5V		–	50	100	nA
			T_J = −40° to +125°C	–	50	500	nA
Oscillator Frequency	f_O	Note 2		47	52	58	kHz
			T_J = −40° to +125°C	42	52	63	kHz
Saturation Voltage	V_{SAT}	I_{OUT} = 3A, Note 3		–	1.4	1.8	V
			T_J = −40° to +125°C	–	1.4	2.0	V
Maximum Duty Cycle	DC	Note 4		93	98	–	%
Current Limit	I_{CL}	Note 2, Note 3		4.2	5.8	6.9	A
			T_J = −40° to +125°C	3.5	5.8	7.5	A
Output Leakage Current	I_L	Note 5	Output = 0V	–	–	2	mA
			Output = −1V	–	7.5	30	mA
Quiescent Current	I_Q	Note 5		–	5	10	mA
Standby Quiescent Current	I_{STBY}	$\overline{ON}$/OFF Pin = 5V (OFF)		–	50	200	µA
$\overline{ON}$/OFF Control							
$\overline{ON}$/OFF Pin Logic Input Level	V_{IH}	V_{OUT} = 0V		2.2	1.4	–	V
			T_J = −40° to +125°C	2.4	1.4	–	V
	V_{IL}	V_{OUT} = Nom Output		–	1.0	1.2	V
			T_J = −40° to +125°C	–	0.8	1.2	V
$\overline{ON}$/OFF Pin Input Current	I_{IH}	$\overline{ON}$/OFF Pin = 5V (OFF)		–	12	30	µA
	I_{IL}	$\overline{ON}$/OFF Pin = 0V (ON)		–	0	10	µA

Note 2. The oscillator frequency reduces to approximately 11kHz in the event of an output short or an overload which causes the regulated output voltage to drop approximately 40% from the nominal outpu voltage. This self protection feature lowers the average power dissipation of the IC by lowering the minimum duty cycle from 5% down to approximately 2%.

Note 3. Output pin sourcing current. No diode, inductor or capacitor connected to output.

Note 4. Feedback pin removed from output and connected to 0V.

Note 5. Feedback pin removed from output and connected to +12V to force the output transistor OFF.

Pin Connection Diagram
(Front View)