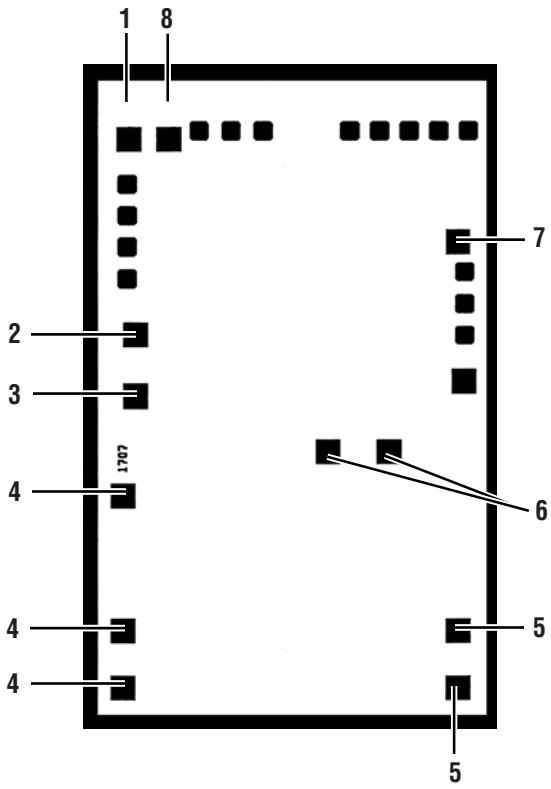
# LTC1707
# High Efficiency Monolithic Synchronous Step-Down Switching Regulator




210 × 116 mils

**PAD FUNCTION**

1. $I_{TH}$
2. RUN/SS
3. $V_{FB}$
4. GND
5. SW
6. $V_{IN}$
7. SYNC/MODE
8. $V_{REF}$

**DIE CROSS REFERENCE**

| LTC Finished Part Number | Order DICE CANDIDATE Part Number Below |
|---|---|
| LTC1707 | LTC1707 DICE |
| LTC1707 | LTC1707 DFN |

## ABSOLUTE MAXIMUM RATINGS

**(Note 1)**

Input Supply Voltage ..... –0.3V to 10V
$I_{TH}$ Voltage ..... –0.3V to 5V
RUN/SS, $V_{FB}$ Voltages ..... –0.3V to $V_{IN}$
SYNC/MODE Voltage ..... –0.3V to $V_{IN}$
P-Channel Switch Source Current (DC) ..... 800mA
N-Channel Switch Sink Current (DC) ..... 800mA
Peak SW Sink and Source Current ..... 1.5A
Junction Temperature (Note 2) ..... 125°C

## DICE ELECTRICAL TEST LIMITS

**$V_{IN}$ = 5V unless otherwise specified.**

| SYMBOL | PARAMETER | CONDITIONS | MIN | MAX | UNITS |
|---|---|---|---|---|---|
| $I_{VFB}$ | Feedback Current | (Note 3) | | 60 | nA |
| $V_{FB}$ | Regulated Feedback Voltage | (Note 3) | 0.78 | 0.82 | V |
| $\Delta V_{OVL}$ | Output Overvoltage Lockout | $\Delta V_{OVL} = V_{OVL} - V_{FB}$ | 20 | 110 | mV |
| $\Delta V_{FB}$ | Reference Voltage Line Regulation | $V_{IN}$ = 3V to 8.5V (Note 3) | | 0.01 | %/V |
| $V_{LOADREG}$ | Output Voltage Load Regulation | $I_{TH}$ Sinking 2µA (Note 3)<br>$I_{TH}$ Sourcing 2µA (Note 3) | | 0.8<br>–0.8 | %<br>% |
| $I_S$ | Input DC Bias Current<br>Pulse Skipping Mode<br>Burst Mode Operation<br>Shutdown<br>Shutdown | (Note 4)<br>$V_{IN}$ = 8.5V, $V_{OUT}$ = 3.3V, $V_{SYNC/MODE}$ = 0V<br>$V_{ITH}$ = 0V, $V_{IN}$ = 8.5V, $V_{SYNC/MODE}$ = Open<br>$V_{RUN/SS}$ = 0V, 3V < $V_{IN}$ < 8.5V<br>$V_{RUN/SS}$ = 0V, $V_{IN}$ < 3V | | <br><br>320<br>35<br> | <br>µA<br>µA<br>µA<br>µA |
| $V_{RUN/SS}$ | Run/SS Threshold | $V_{RUN/SS}$ Ramping Positive | 0.4 | 1.0 | V |
| $I_{RUN/SS}$ | Soft-Start Current Source | $V_{RUN/SS}$ = 0V | 1.2 | 3.3 | µA |
| $I_{SYNC/MODE}$ | SYNC/MODE Pull-Up Current | $V_{SYNC/MODE}$ = 0V | 0.5 | 2.5 | µA |
| $f_{OSC}$ | Oscillator Frequency | $V_{FB}$ = 0.7V<br>$V_{FB}$ = 0V | 315 | 385 | kHz<br>kHz |
| $V_{UVLO}$ | Undervoltage Lockout | $V_{IN}$ Ramping Down from 3V (0°C to 70°C)<br>$V_{IN}$ Ramping Up from 0V (0°C to 70°C) | 2.55<br>2.60 | 2.85<br>3.00 | V<br>V |
| | | $V_{IN}$ Ramping Down from 3V (–40°C to 85°C)<br>$V_{IN}$ Ramping Up from 0V (–40°C to 85°C) | 2.45<br>2.50 | 2.85<br>3.00 | V<br>V |
| $R_{PFET}$ | $R_{DS(ON)}$ of P-Channel FET | $I_{SW}$ = –100mA | | 0.7 | Ω |
| $R_{NFET}$ | $R_{DS(ON)}$ of N-Channel FET | $I_{SW}$ = –100mA | | 0.8 | Ω |
| $I_{PK}$ | Peak Inductor Current | $V_{IN}$ = 4V, $I_{TH}$ = 1.4V, Duty Cycle < 40% | 0.70 | 1.10 | A |
| $I_{LSW}$ | SW Leakage | $V_{RUN/SS}$ = 0V | | ±1000 | nA |
| $V_{REF}$ | Reference Output Voltage | $I_{REF}$ = 0µA | 1.178 | 1.202 | mV |
| $\Delta V_{REF}$ | Reference Output Load Regulation | 0V ≤ $I_{REF}$ ≤ 100µA | | 15 | mV |

**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:

$T_J = T_A + (P_D \bullet \theta_{JA})$

**Note 3**: The LTC1707 is tested in a feedback loop that servos $V_{FB}$ to the balance point for the error amplifier ($V_{ITH}$ = 0.8V).

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



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LT/LT 0605 PRINTED IN USA