



## P2172

Preliminary

**LINEAR INTEGRATED CIRCUIT**

### 100KHZ, 1.25A HIGH EFFICIENCY SWITCHING REGULATORS

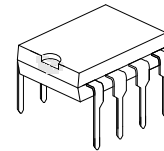
#### DESCRIPTION

The UTC **P2172** is monolithic high power switching regulators. It can be operated in all standard switching configurations including boost, buck, fly-back, forward, inverting and "Cuk."

By utilizing current-mode switching techniques, they provide excellent AC and DC load and line regulation.

#### FEATURES

- \* Wide Input Voltage Range: 3V~60V
- \* Low Quiescent Current: 6mA
- \* Very Few External Parts Required
- \* Self-Protected Against Overloads
- \* Operates in Nearly All Switching Topologies
- \* Flyback-Regulated Mode Has Fully Floating Outputs
- \* Can Be Externally Synchronized



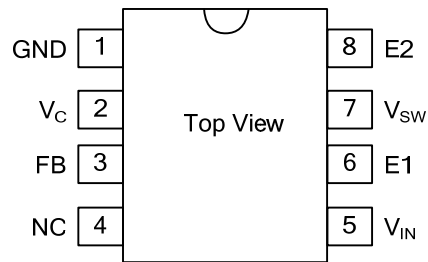
DIP-8

#### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
P2172L-D08-T	P2172G-D08-T	DIP-8	Tube

<p>P2172G-D08-T</p>	<p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Halogen Free</p>	<p>(1) T: Tube</p> <p>(2) D08: DIP-8</p> <p>(3) L: Lead Free, G: Halogen Free</p>
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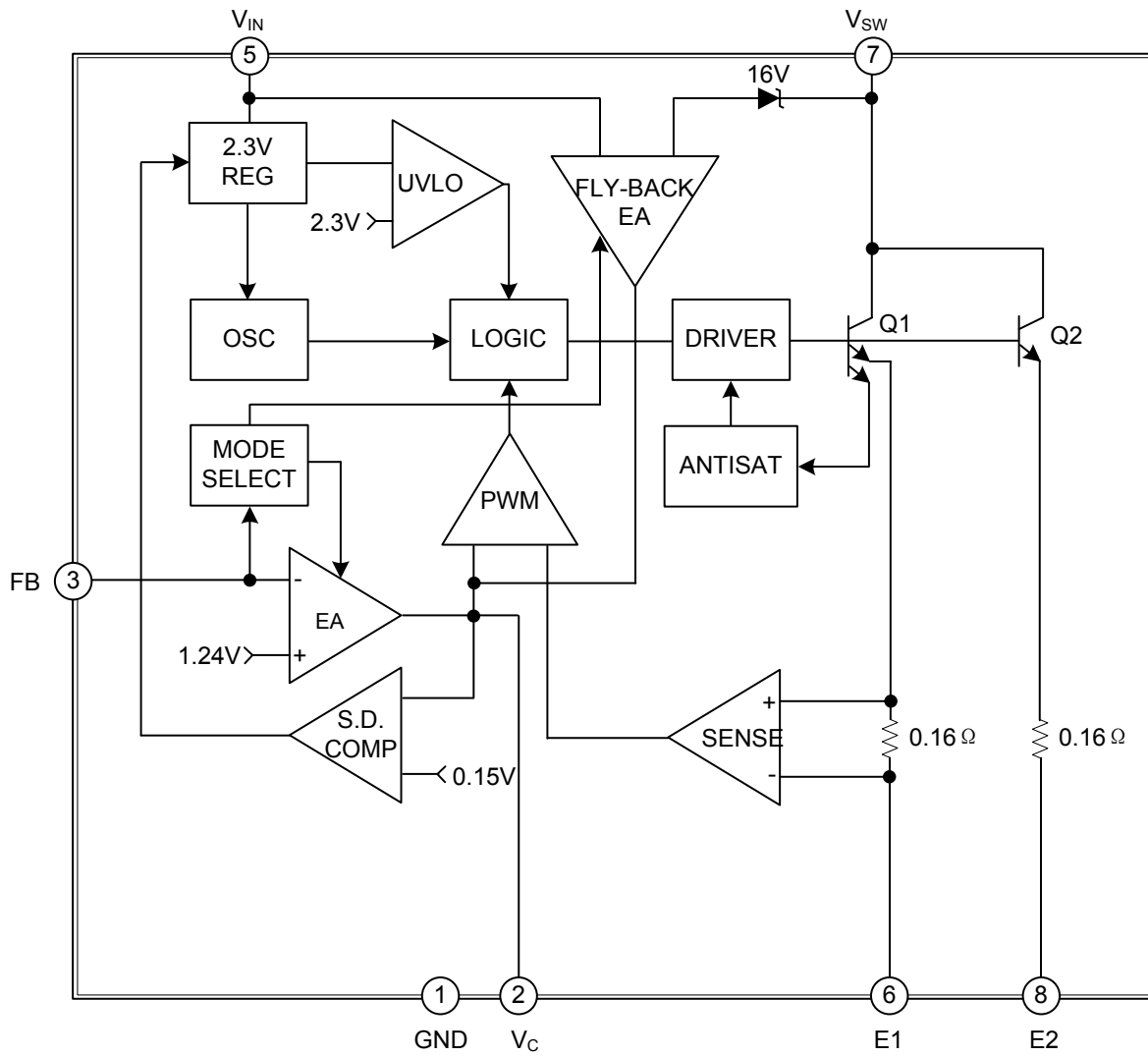
## ■ PIN CONFIGURATION



## ■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	GND	Signal ground. Keep separate from power grounds (E1 and E2).
2	V <sub>C</sub>	Output of transconductance error amplifier.
3	FB	Error amplifier inverting input.
4	NC	Not connect
5	V <sub>IN</sub>	Input supply voltage
6	E1	Power return of first transistor (Q1). This pin must be connected to ground
7	V <sub>SW</sub>	Collector of output transistors.
8	E2	Grounding this pin sets the current limit point to the maximum value. If pin is left open, the current limit is set to half its maximum value

■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{IN}$	60	V
Switch Output Voltage	$V_{SW}$	60	V
Feedback Pin Voltage (Transient, 1ms)		$\pm 15$	V
Operating Junction Temperature Range	$T_J$	-40~100	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-65~150	$^{\circ}\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

### ■ ELECTRICAL CHARACTERISTICS

( $V_{IN}=15\text{V}$ ,  $V_C=0.5\text{V}$ ,  $V_{FB}=V_{REF}$ , output pin open, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference Voltage	$V_{REF}$	Measured at Feedback Pin $V_C=0.8\text{V}$	1.224	1.244	1.264	V
Feedback Input Current	$I_B$	$V_{FB}=V_{REF}$		350	750	nA
Error Amplifier Transconductance	$g_m$	$\Delta I_C=\pm 25\mu\text{A}$	3000	4400	6000	$\mu\text{mho}$
Error Amplifier Source or Sink Current		$V_C=1.5\text{V}$	150	200	350	$\mu\text{A}$
Error Amplifier Clamp Voltage		Hi Clamp, $V_{FB}=1\text{V}$	1.80		2.30	V
		Lo Clamp, $V_{FB}=1.5\text{V}$	0.25	0.38	0.52	V
Reference Voltage Line Regulation		$3\text{V}\leq V_{IN}\leq V_{MAX}$ , $V_C=0.8\text{V}$			0.03	%/V
Error Amplifier Voltage Gain	$A_V$	$0.9\text{V}\leq V_C\leq 1.4\text{V}$	500	800		V/V
Minimum Input Voltage (Note 3)				2.6	3.0	V
Supply Current	$I_Q$	$3\text{V}\leq V_{IN}\leq V_{MAX}$ , $V_C=0.6\text{V}$		6	9	mA
Control Pin Threshold		Duty Cycle=0	0.8	0.9	1.08	V
Normal / Flyback Threshold on Feedback Pin			0.4	0.45	0.54	V
Flyback Reference Voltage (Note 3)	$V_{FB}$	$I_{FB}=50\mu\text{A}$	15.0	16.3	17.6	V
Change in Flyback Reference Voltage		$0.05\leq I_{FB}\leq 1\text{mA}$	4.5	6.8	9	V
Flyback Reference Voltage Line Regulation (Note 3)		$I_{FB}=50\mu\text{A}$ $7\text{V}\leq V_{IN}\leq V_{MAX}$		0.01	0.03	%/V
Flyback Amplifier Transconductance ( $g_m$ )		$\Delta I_C=\pm 10\mu\text{A}$	150	300	650	$\mu\text{mho}$
Flyback Amplifier Source and Sink Current		$V_C=0.6\text{V}$ Source	15	32	70	$\mu\text{A}$
		$I_{FB}=50\mu\text{A}$ Sink	25	40	70	
Output Switch Breakdown Voltage	BV	$3\text{V}\leq V_{IN}\leq V_{MAX}$ , $I_{SW}=1.5\text{mA}$	65	80		V
Output Switch "On" Resistance (Note 2)	$V_{SAT}$			0.60	1.00	$\Omega$
Control Voltage to Switch Current Transconductance				2		A/V
Switch Current Limit	$I_{LIM}$	Duty Cycle=50% Duty	1.25		3.5	A
		Cycle=80% (Note 2)	1.00		2.5	A
Supply Current Increase During Switch On-Time	$\frac{\Delta I_{IN}}{\Delta I_{SW}}$			25	35	mA/A

■ ELECTRICAL CHARACTERISTICS(Cont.)

( $V_{IN}=15V$ ,  $V_C=0.5V$ ,  $V_{FB}=V_{REF}$ , output pin open, unless otherwise noted.)

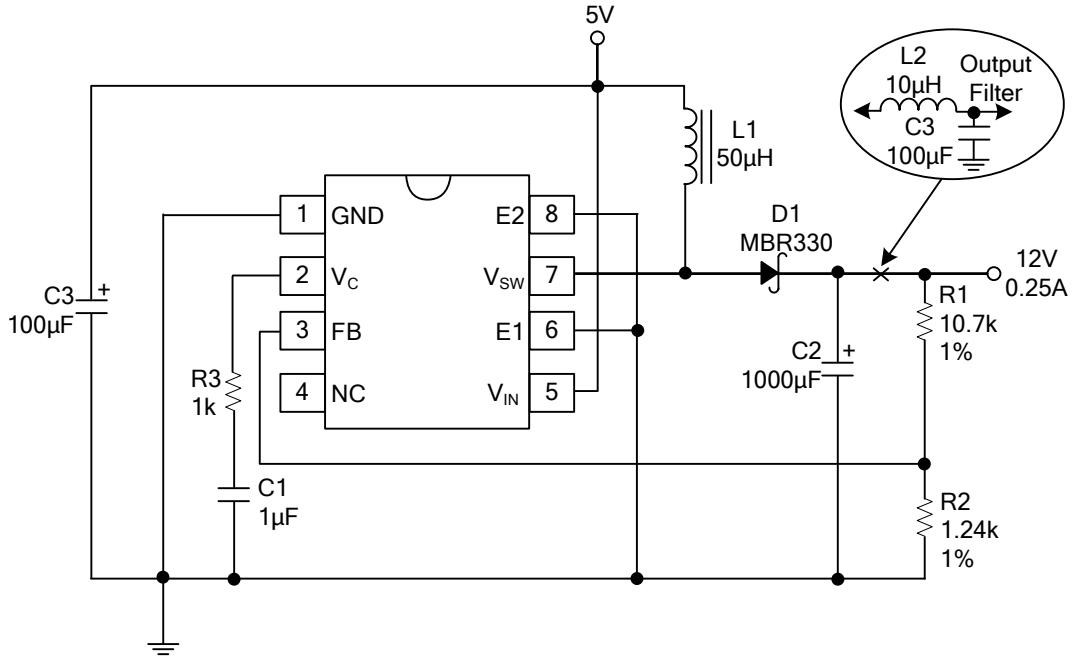
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Switching Frequency	f		88	100	112	kHz
Maximum Switch Duty Cycle	DC <sub>MAX</sub>		85	92	97	%
Shutdown Mode Supply Current		$3V \leq V_{IN} \leq V_{MAX}$ , $V_C=0.05V$		100	250	$\mu A$
Shutdown Mode Threshold Voltage		$3V \leq V_{IN} \leq V_{MAX}$	100	150	250	mV
Flyback Sense Delay Time (Note 3)				1.5		$\mu s$

Notes: 1. Measured with  $V_C$  in hi clamp,  $V_{FB}=0.8V$ ,  $I_{SW}=1A$ .

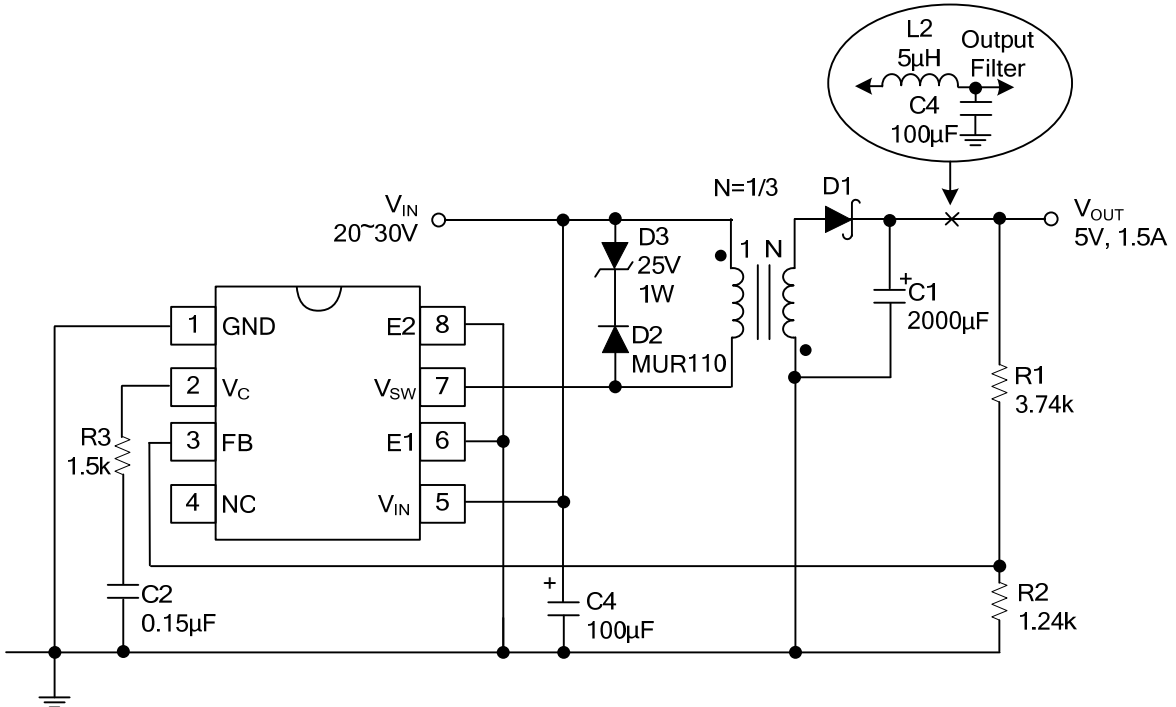
2. For duty cycles (DC) between 50% and 80%, minimum guaranteed switch current is given by  $I_{LIM}=0.833 \times (2-DC)$ .

3. Minimum input voltage for isolated flyback mode is 7V,  $V_{MAX}=55V$  for HV grade in fully isolated mode to avoid switch breakdown.

■ TYPICAL APPLICATION CIRCUIT



Boost Converter (5V~12V)



Flyback Converter

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