

NCP1015

Self-Supplied Monolithic Switcher for Low Standby-Power Offline SMPS

The NCP1015 integrates a fixed-frequency current-mode controller and a 700 V voltage MOSFET. Housed in a PDIP-7 or SOT-223 package, the NCP1015 offers everything needed to build a rugged and low-cost power supply, including soft-start, frequency jittering, short-circuit protection, skip-cycle, a maximum peak current set-point and a Dynamic Self-Supply (no need for an auxiliary winding).

Unlike other monolithic solutions, the NCP1015 is quiet by nature: during nominal load operation, the part switches at one of the available frequencies (65–100 kHz). When the current set-point falls below a given value, e.g. the output power demand diminishes, the IC automatically enters the so-called skip cycle mode and provides excellent efficiency at light loads. Because this occurs at typically 0.25 of the maximum peak value, no acoustic noise takes place. As a result, standby power is reduced to the minimum without acoustic noise generation.

Short-circuit detection takes place when the feedback signal fades away e.g. un-true short-circuit or is broken optocoupler cases. Finally soft-start and frequency jittering further ease the designer task to quickly develop low-cost and robust offline power supplies.

For improved standby performance, the connection of an auxiliary winding stops the DSS operation and helps to consume less than 100 mW at high line.

Features

- Built-in 700 V MOSFET with typical $R_{DS(on)}$ of 11 Ω
- Large Creepage Distance between High-voltage Pins
- Current-mode Fixed Frequency Operation: 65 kHz – 100 kHz
- Skip-cycle Operation at Low Peak Currents Only: No Acoustic Noise!
- Dynamic Self-Supply, No Need for an Auxiliary Winding
- Internal 1 ms Soft-start
- Auto-recovery Internal Output Short-circuit Protection
- Frequency Jittering for Better EMI Signature
- Below 100 mW Standby Power if Auxiliary Winding is Used
- Internal Temperature Shutdown
- Direct Optocoupler Connection
- SPICE Models Available for TRANsient and AC Analysis
- This is a Pb-Free Device

Typical Applications

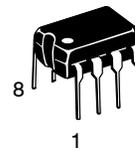
- Low Power ac-dc Adapters for Chargers
- Auxiliary Power Supplies (USB, Appliances, TVs, etc.)



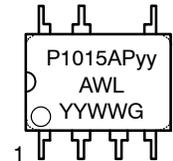
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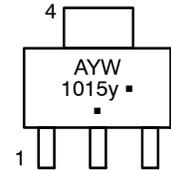
MARKING DIAGRAMS



PDIP-7
CASE 626A
AP SUFFIX



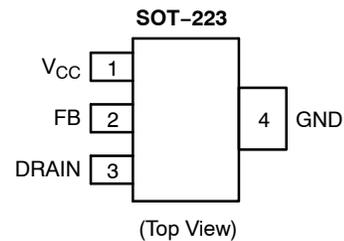
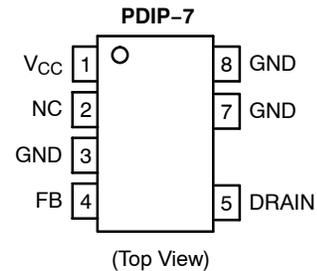
SOT-223
CASE 318E
ST SUFFIX



yy = 06 (65 kHz), 10 (100 kHz)
y = A (65 kHz), B (100 kHz)
A = Assembly Location
WL = Wafer Lot
YY = Year
WW = Work Week
G or ■ = Pb-Free Package

(*Note: Microdot may be in either location)

PIN CONNECTIONS



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 20 of this data sheet.

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Indicative Maximum Output Power from NCP1015

$R_{DS(on)} - I_p$	230 Vac	100 – 250 Vac
11 Ω – 450 mA DSS	14 W	6.0 W
11 Ω – 450 mA Auxiliary Winding	19 W	8.0 W

1. Informative values only, with: $T_{amb} = 50^\circ\text{C}$, circuit mounted on minimum copper area as recommended.

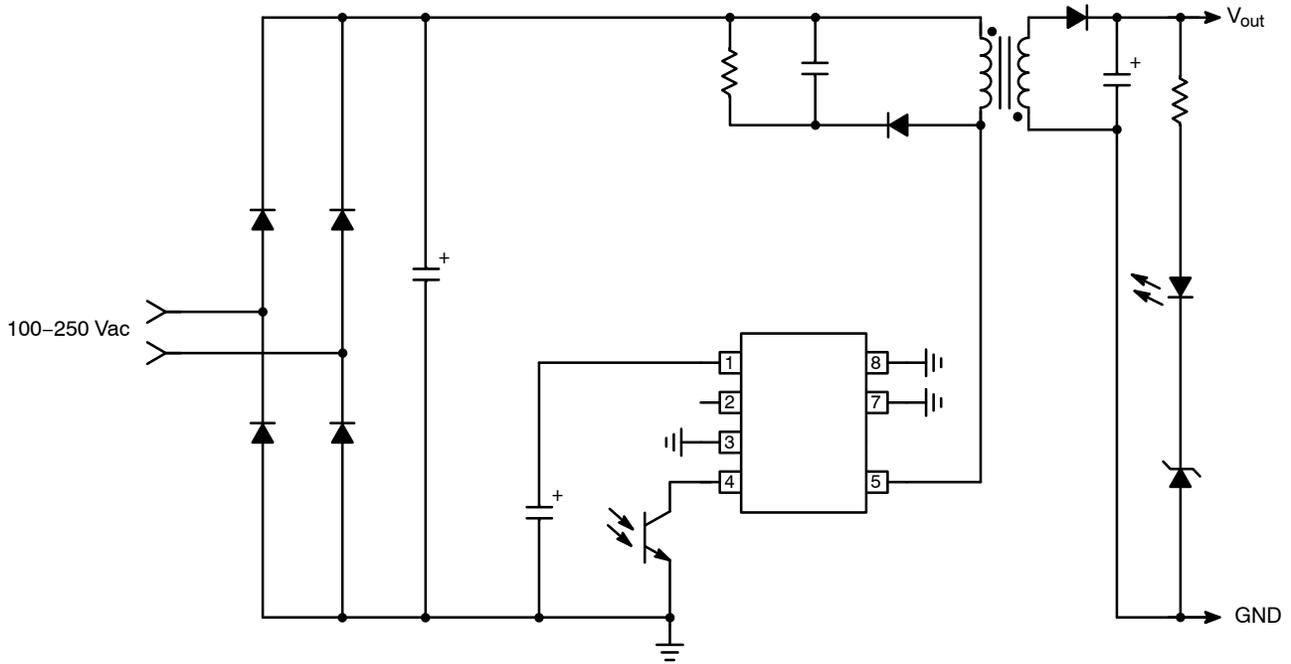


Figure 1. Typical Application Example

PIN FUNCTION DESCRIPTION

Pin No.		Pin Name	Function	Description
SOT-223	PDIP-7			
1	1	V_{CC}	Powers the Internal Circuitry	This pin is connected to an external capacitor of typically 10 μF . The natural ripple superimposed on the V_{CC} participates to the frequency jittering. For improved standby performance, an auxiliary V_{CC} can be connected to Pin 1. The V_{CC} also includes an active shunt which serves as an opto fail-safe protection.
-	2	NC	-	-
-	3	GND	The IC Ground	-
2	4	FB	Feedback Signal Input	By connecting an optocoupler to this pin, the peak current setpoint is adjusted accordingly to the output power demand.
3	5	DRAIN	Drain Connection	The internal drain MOSFET connection.
-	-	-	-	-
-	7	GND	The IC Ground	-
4	8	GND	The IC Ground	-

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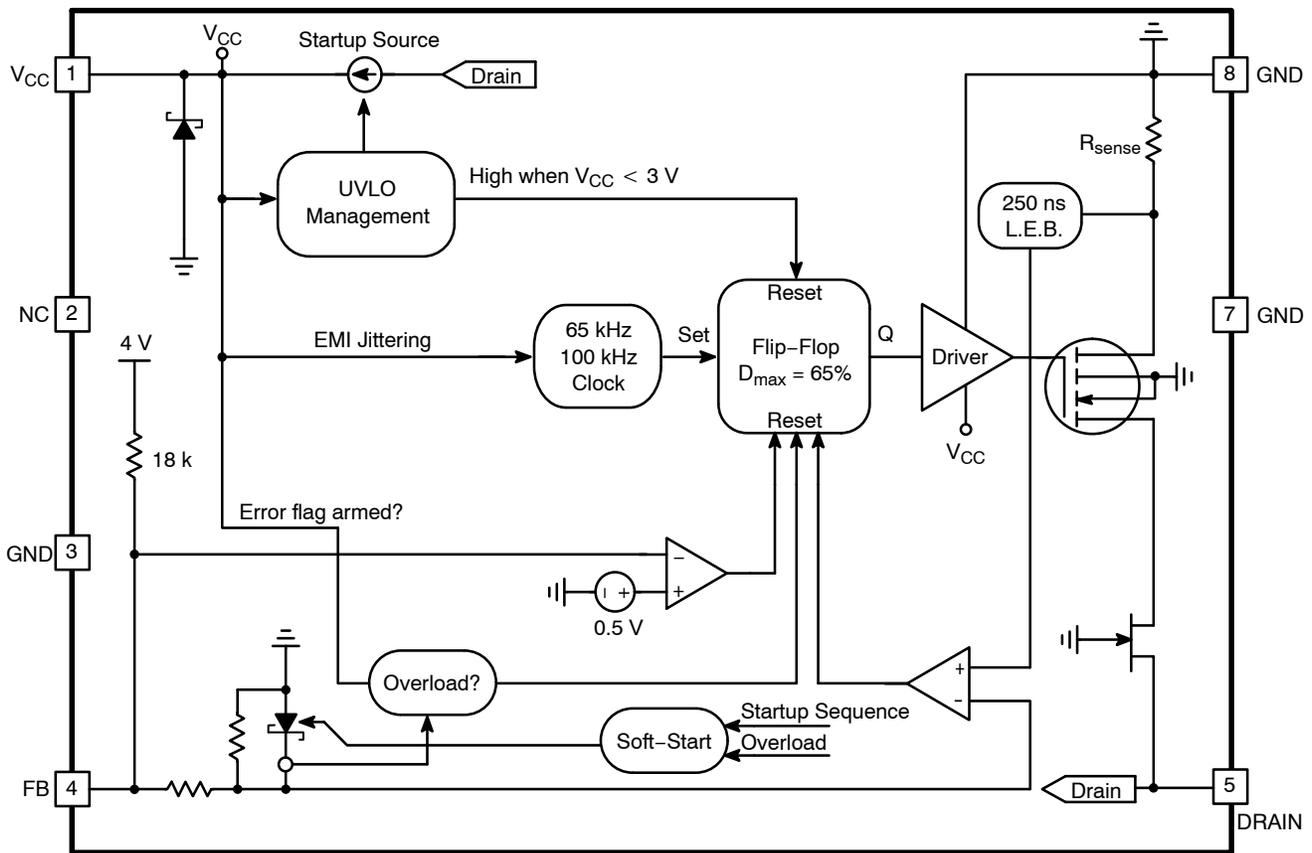


Figure 2. Simplified Internal Circuit Architecture

MAXIMUM RATINGS

Symbol	Rating	Value	Unit
V_{CC}	Power Supply voltage on all pins, except pin 5 (drain)	-0.3 to 10	V
V_{ds}	Drain voltage	-0.3 to 700	V
$I_{ds_{pk}}$	Drain peak current during transformer saturation	1	A
$I_{V_{CC}}$	Maximum current into pin 1	15	mA
$R_{\theta_{JL}}$ $R_{\theta_{JA}}$	Thermal Characteristics P Suffix, Case 626A Junction-to-Lead Junction-to-Air, 2.0 oz (70 μ m) Printed Circuit Copper Clad 0.36 Sq. Inch (2.32 Sq. Cm) 1.0 Sq. Inch (6.45 Sq. Cm)	9.0 77 60	$^{\circ}$ C/W
$R_{\theta_{JL}}$ $R_{\theta_{JA}}$	ST Suffix, Plastic Package Case 318E Junction-to-Lead Junction-to-Air, 2.0 oz (70 μ m) Printed Circuit Copper Clad 0.36 Sq. Inch (2.32 Sq. Cm) 1.0 Sq. Inch (6.45 Sq. Cm)	14 74 55	$^{\circ}$ C/W
$T_{J_{MAX}}$	Maximum Junction Temperature	150	$^{\circ}$ C
	Storage Temperature Range	-60 to +150	$^{\circ}$ C
	ESD Capability, Human Body Model (HBM) (All pins except HV)	2	kV
	ESD Capability, Machine Model (MM)	200	V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.