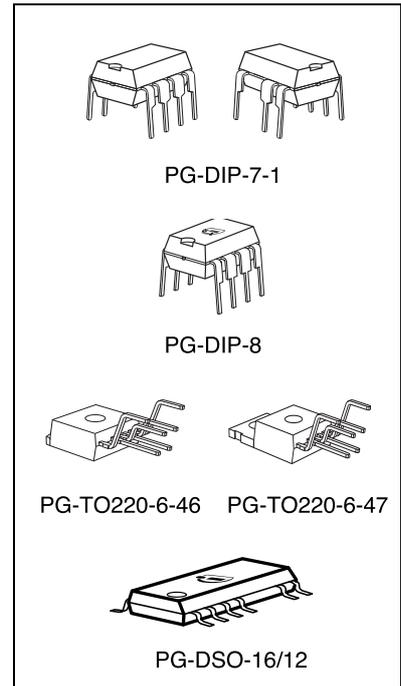


## Off-Line SMPS Current Mode Controller with integrated 650V/800V CoolMOS™

### Product Highlights

- Best in class in DIP8, DIP7, TO220 and DSO16/12 packages
- No heat-sink required for DIP8, DIP7 and DSO16/12
- Increased creepage distance for TO220, DIP7 and DSO16/12
- Isolated drain for TO220 packages
- Lowest standby power dissipation
- Enhanced protection functions with Auto Restart Mode
- Pb-free plating, halogen free mold compound

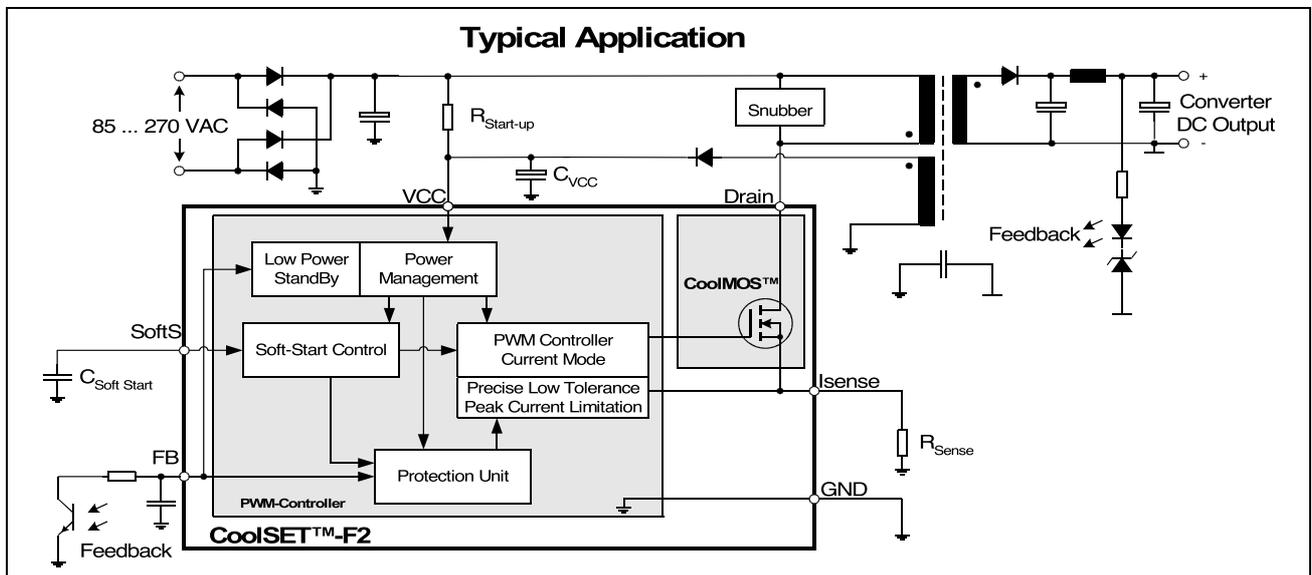


### Features

- 650V/800V avalanche rugged CoolMOS™
- Only few external components required
- Input Vcc Undervoltage Lockout
- 67kHz/100kHz switching frequency
- Max duty cycle 72%
- Low Power Standby Mode to meet European Commission Requirements
- Thermal Shut Down with Auto Restart
- Overload and Open Loop Protection
- Overvoltage Protection during Auto Restart
- Adjustable Peak Current Limitation via external resistor
- Overall tolerance of Current Limiting <math>< \pm 5\%</math>
- Internal Leading Edge Blanking
- User defined Soft Start
- Soft driving for low EMI

### Description

The second generation CoolSET™-F2 provides several special enhancements to satisfy the needs for low power standby and protection features. In standby mode frequency reduction is used to lower the power consumption and support a stable output voltage in this mode. The frequency reduction is limited to 20kHz/21.5 kHz to avoid audible noise. In case of failure modes like open loop, overvoltage or overload due to short circuit the device switches in Auto Restart Mode which is controlled by the internal protection unit. By means of the internal precise peak current limitation, the dimension of the transformer and the secondary diode can be sized lower which leads to more cost effective for the overall system.



## Overview

| Type       | Package    | V <sub>DS</sub> | F <sub>Osc</sub> | R <sub>DSon</sub> <sup>1)</sup> | 230VAC ±15% <sup>2)</sup> | 85-265 VAC <sup>2)</sup> |
|------------|------------|-----------------|------------------|---------------------------------|---------------------------|--------------------------|
| ICE2A0565  | PG-DIP-8   | 650V            | 100kHz           | 4.7Ω                            | 23W                       | 13W                      |
| ICE2A165   | PG-DIP-8   | 650V            | 100kHz           | 3.0Ω                            | 31W                       | 18W                      |
| ICE2A265   | PG-DIP-8   | 650V            | 100kHz           | 0.9Ω                            | 52W                       | 32W                      |
| ICE2A365   | PG-DIP-8   | 650V            | 100kHz           | 0.45Ω                           | 67W                       | 45W                      |
| ICE2B0565  | PG-DIP-8   | 650V            | 67kHz            | 4.7Ω                            | 23W                       | 13W                      |
| ICE2B165   | PG-DIP-8   | 650V            | 67kHz            | 3.0Ω                            | 31W                       | 18W                      |
| ICE2B265   | PG-DIP-8   | 650V            | 67kHz            | 0.9Ω                            | 52W                       | 32W                      |
| ICE2B365   | PG-DIP-8   | 650V            | 67kHz            | 0.45Ω                           | 67W                       | 45W                      |
| ICE2A0565Z | PG-DIP-7-1 | 650V            | 100kHz           | 4.7Ω                            | 23W                       | 13W                      |
| ICE2A180Z  | PG-DIP-7-1 | 800V            | 100kHz           | 3.0Ω                            | 29W                       | 17W                      |
| ICE2A280Z  | PG-DIP-7-1 | 800V            | 100KHz           | 0.8Ω                            | 50W                       | 31W                      |

<sup>1)</sup> typ @ T=25°C

<sup>2)</sup> Maximum power rating at T<sub>a</sub>=75°C, T<sub>j</sub>=125°C and with copper area on PCB = 6cm<sup>2</sup>

| Type       | Package      | V <sub>DS</sub> | F <sub>Osc</sub> | R <sub>DSon</sub> <sup>1)</sup> | 230VAC ±15% <sup>2)</sup> | 85-265 VAC <sup>2)</sup> |
|------------|--------------|-----------------|------------------|---------------------------------|---------------------------|--------------------------|
| ICE2A0565G | PG-DSO-16/12 | 650V            | 100kHz           | 4.7Ω                            | 23W                       | 13W                      |

<sup>1)</sup> typ @ T=25°C

<sup>2)</sup> Maximum power rating at T<sub>a</sub>=75°C, T<sub>j</sub>=125°C and with copper area on PCB = 6cm<sup>2</sup>

| Type       | Package        | V <sub>DS</sub> | F <sub>Osc</sub> | R <sub>DSon</sub> <sup>1)</sup> | 230VAC ±15% <sup>2)</sup> | 85-265 VAC <sup>2)</sup> |
|------------|----------------|-----------------|------------------|---------------------------------|---------------------------|--------------------------|
| ICE2A765I  | PG-TO-220-6-46 | 650V            | 100kHz           | 0.45Ω                           | 240W                      | 130W                     |
| ICE2B765I  | PG-TO-220-6-46 | 650V            | 67kHz            | 0.45Ω                           | 240W                      | 130W                     |
| ICE2A765P2 | PG-TO-220-6-47 | 650V            | 100kHz           | 0.45Ω                           | 240W                      | 130W                     |
| ICE2B765P2 | PG-TO-220-6-47 | 650V            | 67kHz            | 0.45Ω                           | 240W                      | 130W                     |
| ICE2A380P2 | PG-TO-220-6-47 | 800V            | 100kHz           | 1.89Ω                           | 111W                      | 60W                      |

<sup>1)</sup> typ @ T=25°C

<sup>2)</sup> Maximum practical continuous power in an open frame design at T<sub>a</sub>=75°C, T<sub>j</sub>=125°C and R<sub>thCA</sub>=2.7K/W

**Pin Configuration and Functionality**
**1 Pin Configuration and Functionality**
**1.1 Pin Configuration with PG-DIP-8**

| Pin | Symbol | Function   |
|-----|--------|--|
| 1   | SoftS  | Soft-Start   |
| 2   | FB     | Feedback   |
| 3   | Isense | Controller Current Sense Input, CoolMOS™ Source Output |
| 4   | Drain  | 650V <sup>1)</sup> /800V <sup>2)</sup> CoolMOS™ Drain  |
| 5   | Drain  | 650V <sup>1)</sup> /800V <sup>2)</sup> CoolMOS™ Drain  |
| 6   | N.C    | Not connected  |
| 7   | VCC    | Controller Supply Voltage                              |
| 8   | GND    | Controller Ground                                      |

1) at T<sub>j</sub> = 110°C

2) at T<sub>j</sub> = 25°C

**1.2 Pin Configuration with PG-DIP-7-1**

| Pin | Symbol | Function   |
|-----|--------|--|
| 1   | SoftS  | Soft-Start   |
| 2   | FB     | Feedback   |
| 3   | Isense | Controller Current Sense Input, CoolMOS™ Source Output |
| 4   | N.C.   | Not connected  |
| 5   | Drain  | 650V <sup>1)</sup> /800V <sup>2)</sup> CoolMOS™ Drain  |
| 7   | VCC    | Controller Supply Voltage                              |
| 8   | GND    | Controller Ground                                      |

1) at T<sub>j</sub> = 110°C

2) at T<sub>j</sub> = 25°C

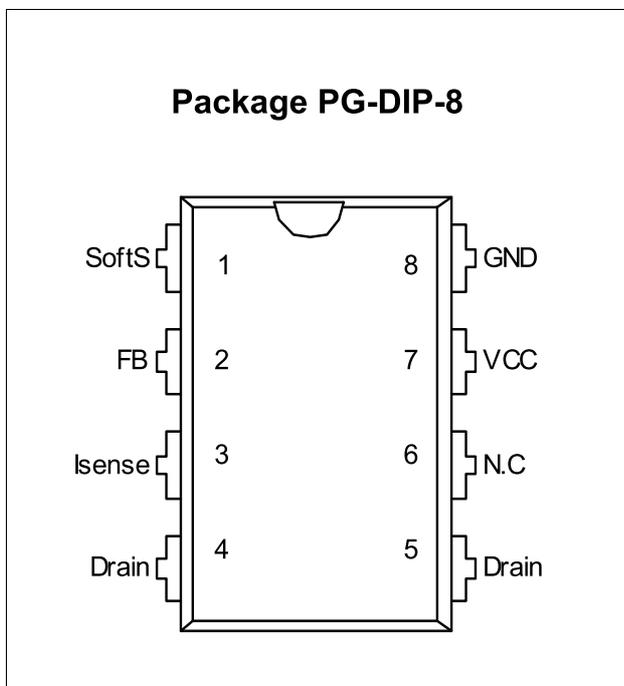


Figure 1 Pin Configuration PG-DIP-8 (top view)

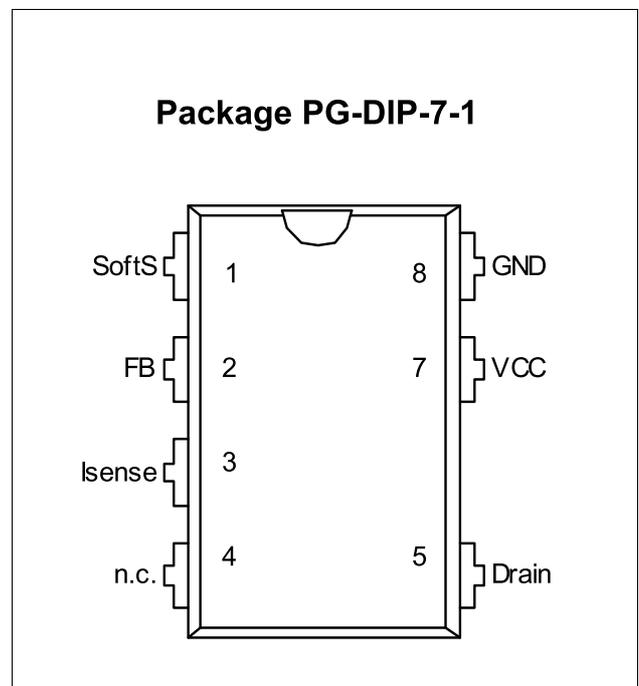


Figure 2 Pin Configuration PG-DIP-7-1 (top view)

**Pin Configuration and Functionality**
**1.3 Pin Configuration with PG-TO220-6-46/7**

| Pin | Symbol | Function   |
|-----|--------|--|
| 1   | Drain  | 650V <sup>1)</sup> CoolMOS™ Drain                      |
| 3   | Isense | Controller Current Sense Input, CoolMOS™ Source Output |
| 4   | GND    | Controller Ground                                      |
| 5   | VCC    | Controller Supply Voltage                              |
| 6   | SoftS  | Soft-Start   |
| 7   | FB     | Feedback   |

<sup>1)</sup> at  $T_j = 110^\circ\text{C}$

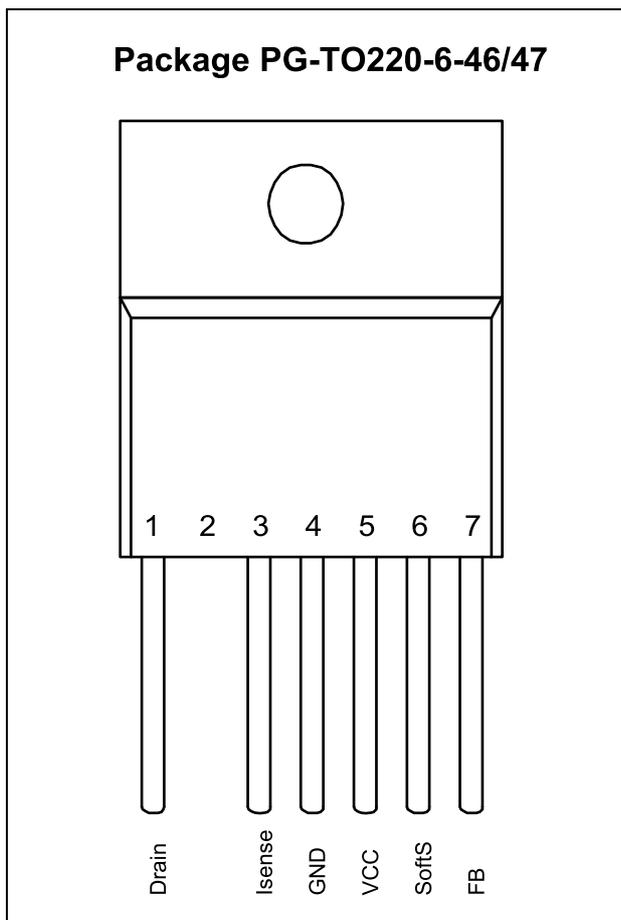


Figure 3 Pin Configuration PG-TO220-6-46/47 (top view)

**1.4 Pin Configuration with PG-DSO-16/12**

| Pin | Symbol | Function   |
|-----|--------|--|
| 1   | N.C.   | Not Connected  |
| 2   | SoftS  | Soft-Start   |
| 3   | FB     | Feedback   |
| 4   | Isense | Controller Current Sense Input, CoolMOS™ Source Output |
| 5   | Drain  | 650V <sup>1)</sup> CoolMOS™ Drain                      |
| 6   | Drain  | 650V <sup>1)</sup> CoolMOS™ Drain                      |
| 7   | Drain  | 650V <sup>1)</sup> CoolMOS™ Drain                      |
| 8   | Drain  | 650V <sup>1)</sup> CoolMOS™ Drain                      |
| 9   | N.C.   | Not Connected  |
| 10  | N.C.   | Not Connected  |
| 11  | VCC    | Controller Supply Voltage                              |
| 12  | GND    | Controller Ground                                      |

<sup>1)</sup> at  $T_j = 110^\circ\text{C}$

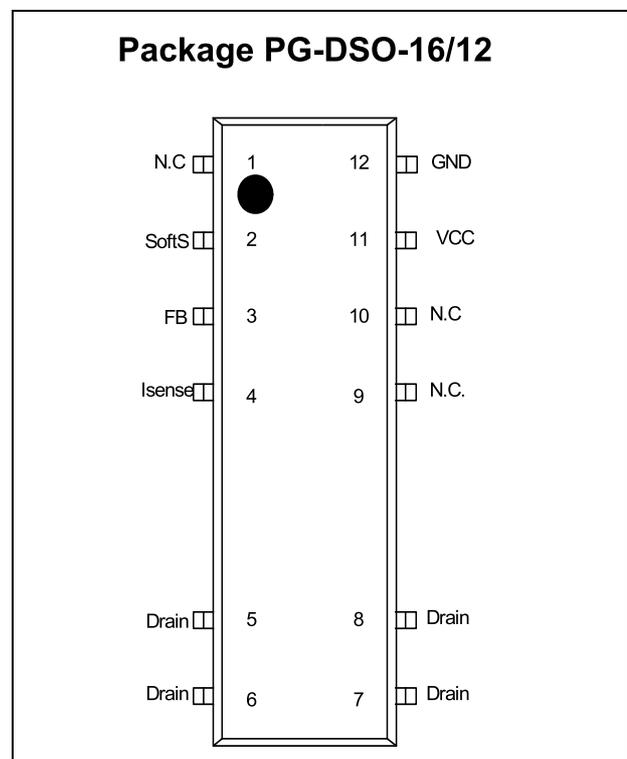


Figure 4 Pin Configuration PG-DSO-16/12 (top view)