

# Bias supply DC-DC

## KIT\_6W\_13V\_P7\_950V

Auxiliary supply solution featuring off-line SMPS current mode controller IC with 950 V CoolMOS™ P7 SJ MOSFET



# Description

## KIT\_6W\_13V\_P7\_950V



**Ordering code:**  
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### Board components

- › CoolSET™ 5<sup>th</sup> gen. Stand-alone controller (ICE5QSAG)
- › 950V CoolMOS™ P7 SJ MOSFET (IPU95R3K7P7)

### Board specifications

- › Input voltage:  $90V_{DC} - 440 V_{DC}$
- › Output voltage:  $13V_{DC}$  (pri. + sec. side)
- › Output power max.: 6W (pri. + sec. side)

# Technical Parameter

## KIT\_6W\_13V\_P7\_950V



### Summary

Quasi-resonant flyback using a Infineon's fifth generation controller.

-Snubberless operation to improve efficiency, 950V breakdown voltage allows operating off of higher input voltages.

Primary side regulated 18V and a secondary side unregulated 13V output.

In power supplies that are used for server, telecom, and industrial applications there is typically a small bias power supply in addition to the main power converter. This 6W bias board is designed to run in a system where it is continuously powered from the 400V<sub>DC</sub> output of a boost power factor correction (PFC) converter and provides power to fans, gatedrivers, and controllers. This board uses the ICE5QSAG quasi-resonant (QR) flyback controller and the new 950V CoolMOS™ P7 (IPU95R3K7P7). This 950V breakdown voltage gives additional margin in the system to ensure the bias continues to run through surge events. This design was done as a snubberless flyback converter to further improve the efficiency over the entire load range.

Description	Value
Max. Efficiency [%]	85
Max. Efficiency [%] @ Output Current [A]	0.35
Max. Efficiency [%] @ Input Voltage [V]	400
Nom. Efficiency [%]	85
Efficiency @ 10% load [%]	50
Efficiency @ 50% load [%]	85
Efficiency @ 100% load [%]	85
Switching frequency min [kHz]	25
Switching frequency max [kHz]	60
Input Voltage Type	DC
Input Voltage min [V]	90
Input Voltage nom [V]	380
Input Voltage max [V]	440

### ICE5QSAG

#### Description:

- › Infineon latest 5th generation quasi-resonant flyback PWM controller offers high performance and comprehensive suite of protection to increase system robustness.

#### Summary of Features:

- › Novel quasi-resonant switching scheme
- › Rapid and adjustable start-up with cascode configuration
- › 2 level selectable active burst mode level
- › Built-in digital soft-start
- › Cycle by cycle peak current limitation
- › Digital frequency reduction with decreasing load for higher efficiency
- › Adjustable line input over-voltage and brown IN/OUT protection
- ›  $V_{CC}$  and CS pin short to ground protection
- › OLP, output short, output over-voltage, OTP with hysteresis and  $V_{CC}$  over/under voltage protection
- › Auto-restart for all protection features



#### Benefits:

- › High efficiency with latest CoolMOS™ P7 SJ MOSFET family and quasi-resonant switching scheme
- › Auto-restart recovery scheme to minimize interruption to system operation
- › Extensive protection coverage to increase system robustness
- › Rapid start-up performance with cascode configuration

### IPU95R3K7P7

#### Description:

- › Designed to meet the growing consumer needs in the high voltage MOSFETs arena, the latest 950V CoolMOS™ P7 technology focuses on the low-power SMPS market.

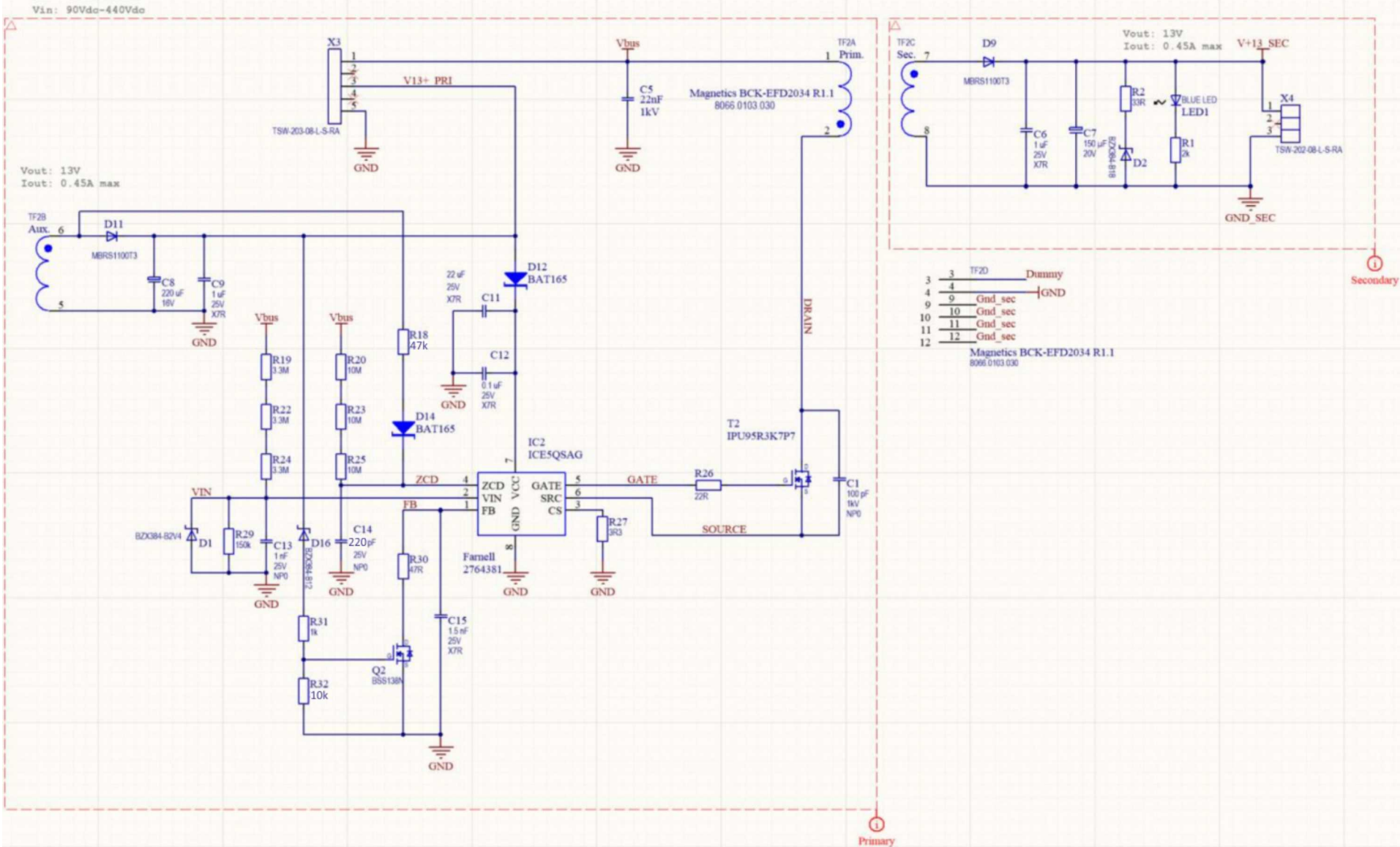
#### Summary of Features:

- › Offering 50V more blocking voltage than its predecessor 900V CoolMOS™ C3, the 950V CoolMOS™ P7 series delivers outstanding performance in terms of efficiency, thermal behavior and ease-of-use. As the all other P7 family members, the 950V CoolMOS™ P7 series comes with an integrated Zener diode ESD protection. The integrated diode considerably improves ESD robustness, thus reducing ESD-related yield loss and reaching exceptional ease-of-use levels. CoolMOS™ P7 is developed with best-in-class VGS(th) of 3V and a narrow tolerance of only  $\pm 0.5V$ , which makes it easy to drive and design-in.



# Schematic

## KIT\_6W\_13V\_P7\_950V



# Transformer

## KIT\_6W\_13V\_P7\_950V

AVV. Wind.	CONDUTTORE Wire	Nr. SPIRE Nr. of turns	R o t a z	PIN DI USCITA Pin output	SPIRE STRATO Turns per layer	Nr. STRATI Nr. of layers	NOTE Remarks
N1	Filo rame Ø0,15 Rif.4	0 65	+	2 3	56	2	ESEGUIRE 1 GIRO DI SPONDIRA H=3MM RIF.9 LATO 7-12 Execute 1 turn of tape h=3mm ref.9 side 7-12
ISOLAMENTO: 2		GIRI DI NASTRO ADESIVO POLIESTERE RIF. turns of polyester adhesive tape Ref.		7			
N2	TEX-E050 Rif.5	0 10	+	7 8	10	1	ATTRAVERSAMENTO A 90° SU NASTRO LATERALMENTE Perpendicular crossing on tape
ISOLAMENTO: 2		GIRI DI NASTRO ADESIVO POLIESTERE RIF. turns of polyester adhesive tape Ref.		7			
N3	Filo rame Ø0,50 Rif.6	0 10	+	6 5	10	1	LASCIARE 3MM LATO 7-12 ATTRAVERSAMENTO A 90° SU NASTRO LATERALMENTE Leave 3mm side 7-12. Perpendicular crossing on tape
ISOLAMENTO: 2		GIRI DI NASTRO ADESIVO POLIESTERE RIF. turns of polyester adhesive tape Ref.		7			
N4	Filo rame Ø0,15 Rif.4	0 65	+	3 1	46	2	ESEGUIRE 1 GIRO DI SPONDIRA H=3MM RIF.9 LATO 7-12 E 1 GIRO DI SPONDIRA H=1MM RIF.8 LATO 1-6 Execute 1 turn of tape H=3mm ref.9 side 7-12 and 1 turn of tape H=1mm ref.8 side 1-6
ISOLAMENTO: 2		GIRI DI NASTRO ADESIVO POLIESTERE RIF. turns of polyester adhesive tape Ref.		7			

POSIZIONAMENTO ROCCHETTO Positioning of the coilformer	PIEDINATURA (VISTA DAL BASSO) Pin-out (bottom view)

SCHEMA ELETTRICO Electrical diagram

MONTAGGIO – Assembling		
<p>APPLICARE NR.2 PIASTRINI ISOLANTI RIF.11 Apply nr.2 spacers ref.11</p>		
<p>ASSEMBLARE I SEMINUCLEI MEDIANTE 2 GIRI DI NASTRO RIF.10 Fix the halfcores with 2 turns of tape ref.10</p>		
<p>BLOCCARE NUCLEO/NUCLEO E ROCCHETTO/NUCLEO MEDIANTE RIF.15+16 Fix core/core and coil/core with ref.15+16</p>		
<p>TAGLIARE PIN 3 DOPO LA SALDATURA cut pin 3 after soldering</p>		
<p>2011/65/UE (RoHS-2) Compliant</p>		
<p>DIMENSIONI IN MILLIMETRI Dimensions in millimeters</p>		

COLLAUDO ELETTRICO – Electrical checking			
TIPO DI PROVA – Test	CONDIZIONI DI PROVA – Test Conditions	LIMITI – Limits	
INDUTTANZA Inductance	2-1 @ 10 kHz – 100 mV	4.25 ÷ 5.75 mH	
RAPPORTO SPIRE Turns ratio	TRA TUTTI GLI AVV. @ 10kHz – 100mV Between all windings	< 1 SPIRA Turn	
RIGIDITA' DIELETTRICA Dielectric strength	2+1+6+5/7+8 @ 4200 V – 50 Hz – 2 sec.	SUPERARE LA PROVA pass the test	
RIGIDITA' DIELETTRICA Dielectric strength	2+1/6+5 @ 300 V – 50 Hz – 2 sec.	SUPERARE LA PROVA pass the test	
INDUTTANZA DISPERSA Leakage inductance	2-1 @ 10 kHz – 100 mV – 5+6+7+8 c.c.	< 40 µH	

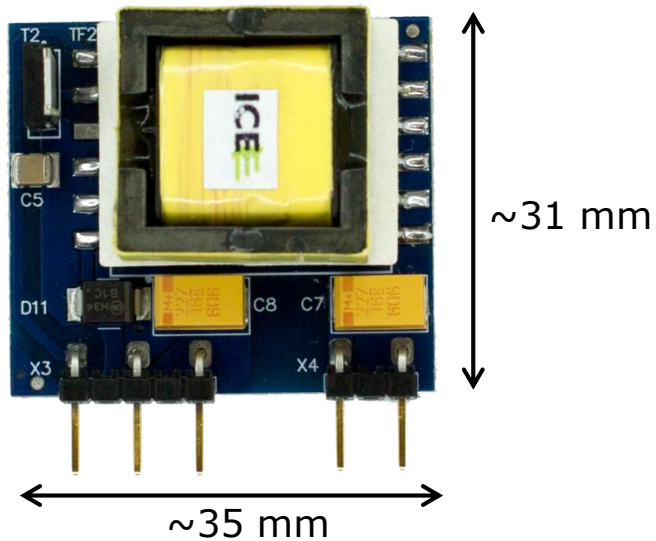
REV	DATA	APPR	RIF.	MOD.	DESCRIZIONE MODIFICA	REDAZIONE	VERIFICA E APPROVAZIONE	
Rev	Appr. Date	Ref. Mod.	Ref. Mod.	Description of modification	Editing	Check and approval		
01	30.06.17				EMISSIONE – Release	C. Picciani	D. Di Giorgio	
TRANSFORMERS				DESCRIZIONE-Description				Transformer EFD20 SMD (6W_BIAS_V2)
Mod.		DOCUMENTO-Document		CODICE-Part Number		REV.-Revision		
AQ 05.09		P.F.		8066.0103.030		01		
				DATA EMISSIONE-Release date		30.06.17		
				PAG.-Page		1/1		

# Base board KIT\_6W\_13V\_P7\_950V



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## Technical Material

- > Application Notes
- > Simulation Models
- > Datasheets
- > PCB Design Data

> [www.infineon.com/kit-6w-13v-p7-950](http://www.infineon.com/kit-6w-13v-p7-950)

## Evaluation Boards

- > Evaluation Boards
- > Demoboards
- > Reference Designs

> [www.infineon.com/evaluationboards](http://www.infineon.com/evaluationboards)

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- > Technical Videos
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The screenshot shows the Infineon website header with the following elements:

- Infineon logo
- Navigation menu: Products, Applications, **Tools** (highlighted with a red box and '3'), About Infineon, Careers
- Utility links: **Newsletter** (highlighted with a red box and '1'), Contact, **Where to Buy** (highlighted with a red box and '2'), English, Login
- Search bar with a magnifying glass icon
- Main banner: A city skyline at night with the word "Lighting" in large white text. Below it, a sub-headline reads "New LED controller enables low-wattage luminaire designs August 26th 17:00 CEST" and a "Register Now!" button with a right arrow.
- Left and right navigation arrows on the banner.
- Five small grey dots at the bottom of the banner indicating a carousel.

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  - Automotive System IC
  - ESD & EMI
  - Microcontroller
  - RF & Wireless Control
  - Security IC
  - Sensor
  - Smart Card IC
  - Interface
  - Transistor & Diode

- Power Overview
  - Power MOSFET
  - IGBT
  - Smart Low-Side & High-Side Switches
  - Linear Voltage Regulator
  - DC-DC Converter
  - LED Driver | Lighting ICs
  - Silicon Carbide (SiC)
  - High Power Thyristors & Diodes
  - Motor Control & Gate Driver
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