Bias supply DC-DC KIT_6W_18V_P7_950V

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

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Description
KIT_6W_18V_P7_950V



Ordering code:
KIT_6W_18V_P7_950V

Board components

- CoolSET™ standalone controller (ICE5QSAG)
- 950 V CoolMOS™ P7 SJ MOSFET (IPU95R3K7P7)

Board specifications

- Input voltage: 90 V_{DC} - 440 V_{DC}
- Output voltage: 18 V_{DC} (prim. and sec. side)
- Output power max.: 6 W (prim. + sec. side)

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Technical Parameter KIT_6W_18V_P7_950V

Summary

Quasi-resonant flyback using a Infineon's second 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 18V 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 400VDC output of a boost power factor correction (PFC) converter and provides power to the fan, gatedrivers, and controller. 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

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Product features
KIT_6W_18V_P7_950V

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

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Product features
KIT_6W_18V_P7_950V

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 $V_{GS(th)}$ of 3V and a narrow tolerance of only ± 0.5V, which makes it easy to drive and design-in.



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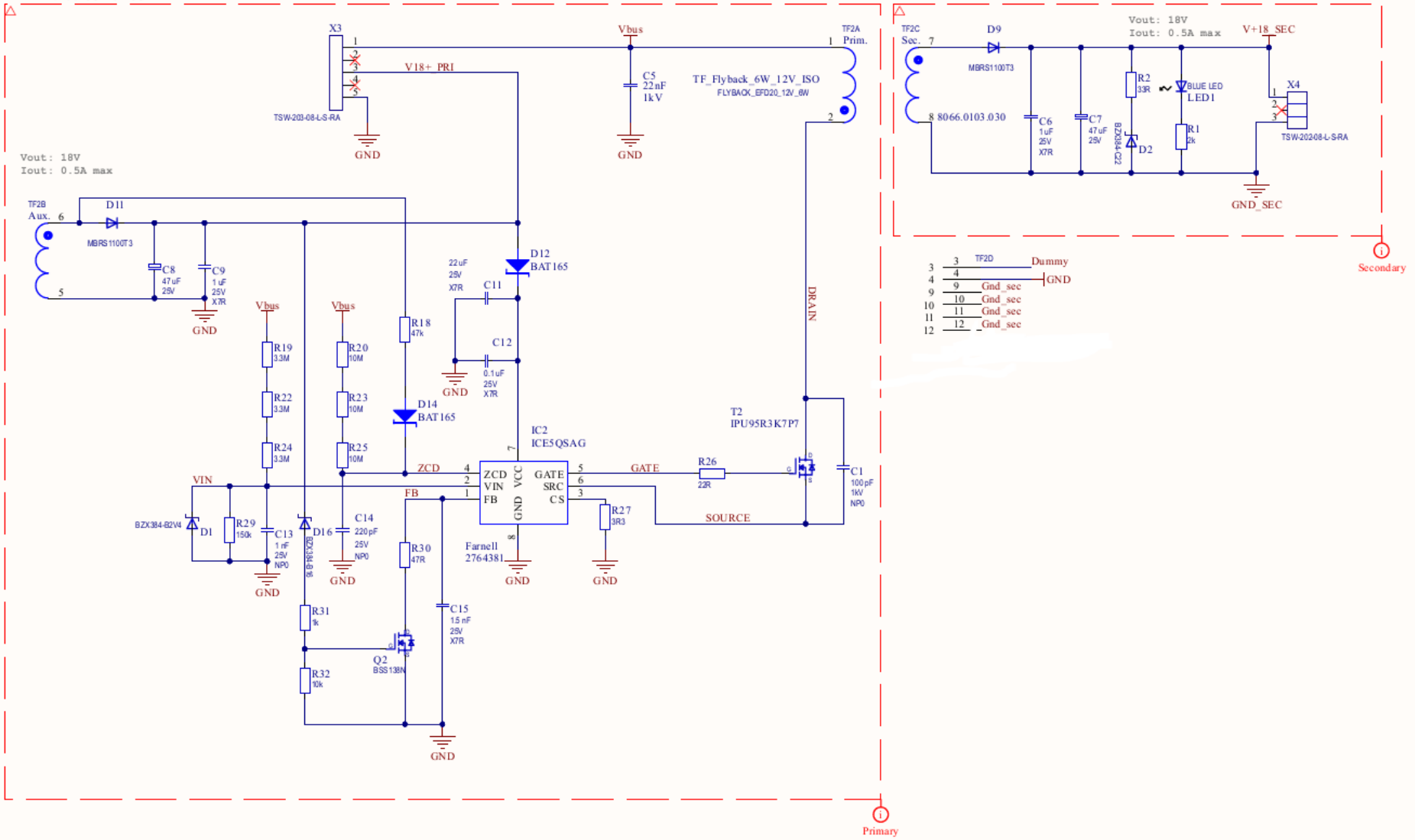
Schematic
KIT_6W_18V_P7_950V



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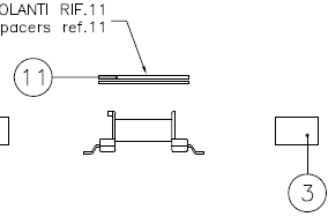
Transformer
KIT_6W_18V_P7_950V

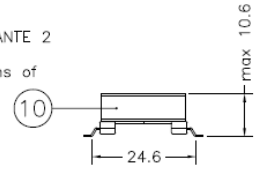
AVV. Wind.	CONDUTTORE Wire	Nr. SPIRE Nr. of turns	R p a z	PIN DI USCITA Pin output	SPIRE STRATO Turns per layer	Nr. STRATI Nr. of layers	NOTE Remarks
N1	Filo rame Ø0,15 Rif.4	0 65	+	2 3	56	2	ESEGUIRE 1 GIRO DI SPONDINA H=3MM RIF.9 LATO 7–12 Execute 1 turn of tape h=3mm ref.9 side 7–12
ISOLAMENTO: Insulation:	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: Insulation:	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: Insulation:	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 SPONDINA H=3MM RIF.9 LATO 7–12 E 1 GIRO DI SPONDINA 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: Insulation:	2	GIRI DI NASTRO ADESIVO POLIESTERE RIF. turns of polyester adhesive tape Ref.		7			

MONTAGGIO – Assembling

APPLICARE NR.2 PIASTRINI ISOLANTI RIF.11
Apply nr.2 spacers ref.11

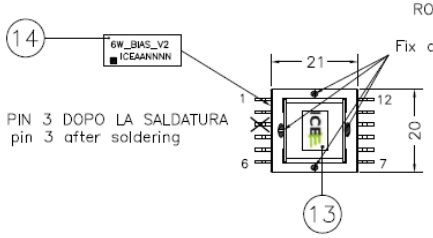


ASSIEMARE I SEMINUCLEI MEDIANTE 2 GIRI DI NASTRO RIF.10
Fix the halfcores with 2 turns of tape ref.10



BLOCCARE NUCLEO/NUCLEO E ROCCHETTO/NUCLEO MEDIANTE RIF.15+16
Fix core/core and coil/core with ref.15+16

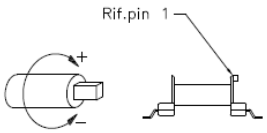
TAGLIARE PIN 3 DOPO LA SALDATURA
cut pin 3 after soldering



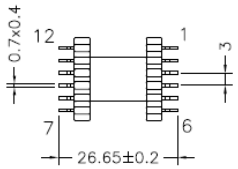
2011/65/UE (RoHS–2) Compliant

DIMENSIONI IN MILLIMETRI
Dimensions in millimeters

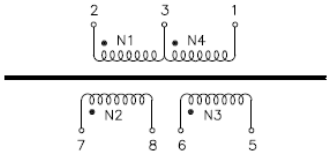
POSIZIONAMENTO ROCCHETTO
Positioning of the coilformer



PIEDINATURA (VISTA DAL BASSO)
Pin–out (bottom view)



SCHEMA ELETTRICO
Electrical diagram



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. Between all windings @ 10kHz – 100mV	< 1 SPIRA Turn
RIGIDITÀ DIELETTRICA Dielectric strength	2+1+6+5/7+8 @ 4200 V – 50 Hz – 2 sec.	SUPERARE LA PROVA pass the test
RIGIDITÀ 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 Rev	DATA APPR Appr. Date	RIF. MOD. Ref. Mod.	DESCRIZIONE MODIFICA Description of modification	REDAZIONE Editing	VERIFICA E APPROVAZIONE Check and approval
01	30.06.17		EMISSIONE – Release	C. Picciani	D. Di Giorgio

I.C.E. TRANSFORMERS

DESCRIZIONE–Description	Transformer EFD20 SMD (6W_BIAS_V2)			
DOCUMENTO–Document	CODICE–Part Number	REV.–Revision	DATA EMISSIONE–Release date	PAG.–Page
P.F.	8066.0103.030	01	30.06.17	1/1

Mod. AQ 05.09

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Base board
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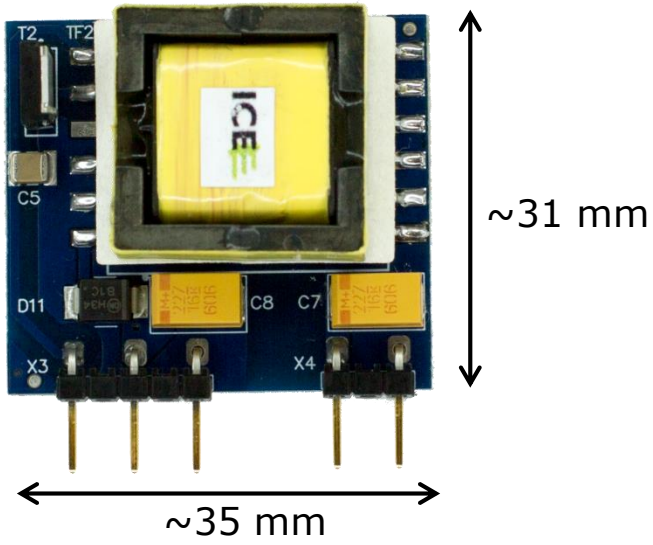

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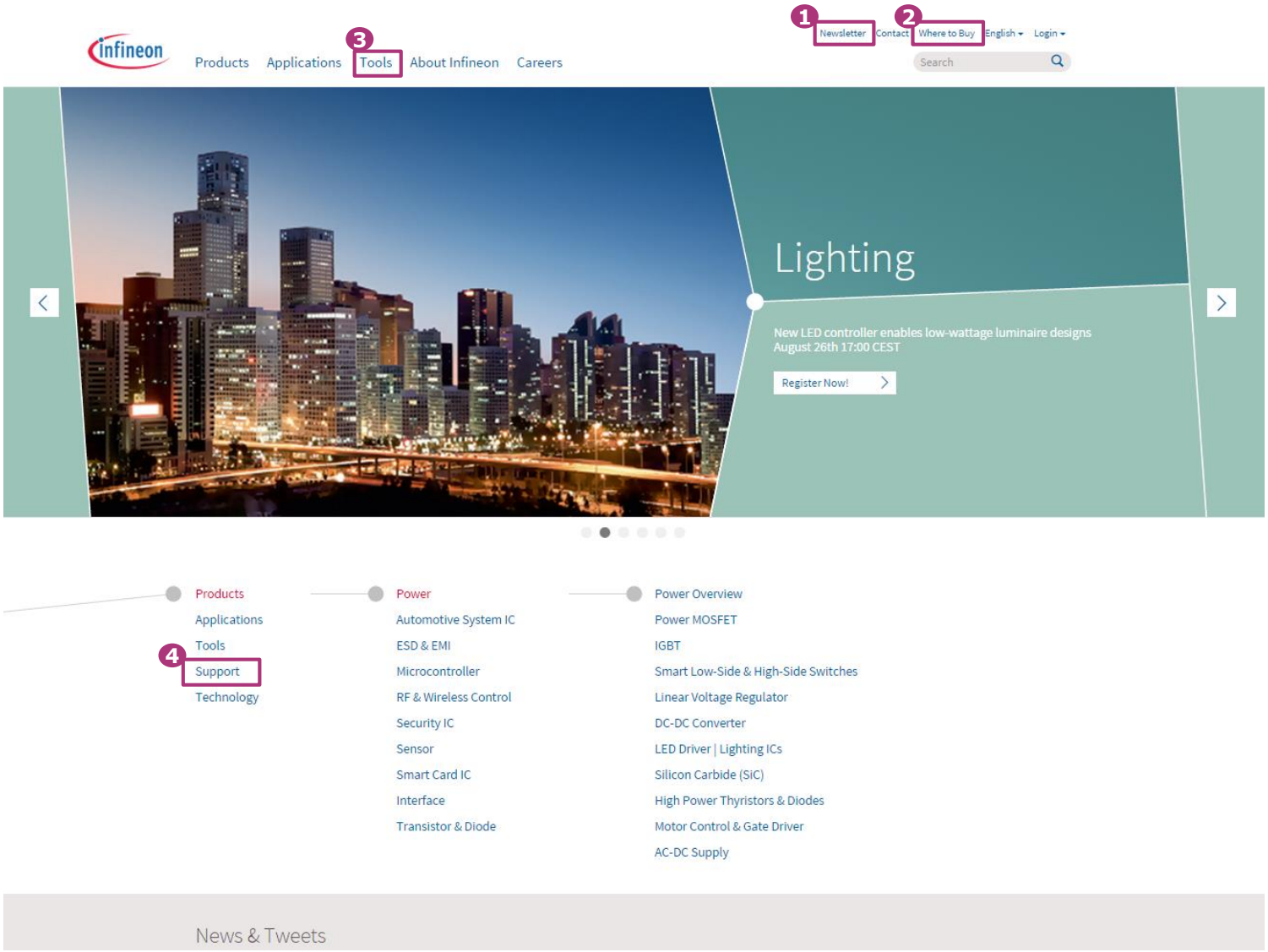

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