LITIX™ Power TLD5097EL

Application Boards

V2_LITIX

10.02.2014

ATV BP LI

www.infineon.com/litix-power-appboards

LITIX™ Power
TLD5097EL - Application Boards Overview

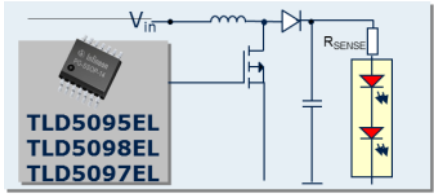
- LITIX™ Power – General Overview
- LITIX™ Power – TLD5097EL Appboards w/o IO Filter Description
  - Boost to GND configuration (B2G) – Topology “BOOST”
  - Boost to Battery (B2B) – Topology “BUCK / BOOST”
  - SEPIC configuration – Topology “BUCK / BOOST”
- LITIX™ Power - Support Material Overview

LITIX™ Power
TLD5097EL - Application Boards Overview

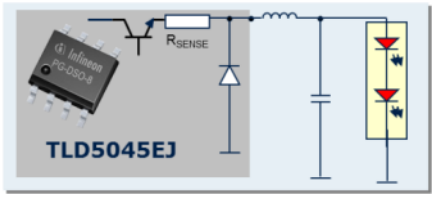
- LITIX™ Power – General Overview
- LITIX™ Power – TLD5097EL Appboards w/o IO Filter Description
  - Boost to GND configuration (B2G) – Topology “BOOST”
  - Boost to Battery (B2B) – Topology “BUCK / BOOST”
  - SEPIC configuration – Topology “BUCK / BOOST”
- LITIX™ Power - Support Material Overview

Our TLD50xx DCDC Family is well established in Automotive LED Lighting Applications

TLD50xx Family



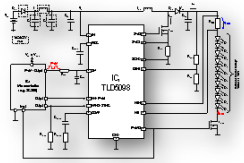
DC/DC Controller IC
Boost, Buck, Buck-Boost, SEPIC and Flyback, PWM dimming, switching frequency (100-500kHz)



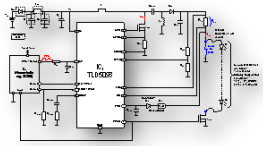
DC/DC Driver IC
Buck, integrated power stage (700mA), freewheeling diode, sense resistor PWM dimming,

The Topology "allrounder"

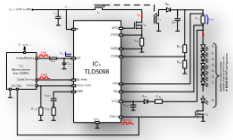
BOOST to GND



SEPIC

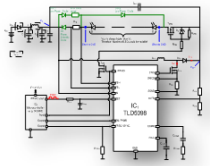


FLYBACK

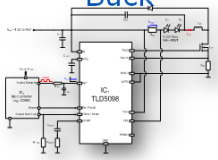


TLD509x

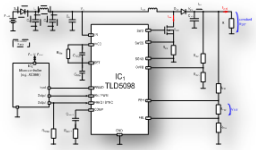
Boost to Battery



Buck



Constant Voltage Supply



Well established in the Market





TLD50xx




Source: Mercedes-Benz


Key Features & Benefits

- TLD509xEL: Multitopology 1ch DC/DC controller Family
- wide LED current range via simple adaptation of external components
- good EMC performance
- built in protection and diagnostic features
- constant Current or Constant Voltage Regulation
- PWM dimming
- analog dimming for TLD5097EL and TLD5098EL
- TLD5045EJ: High integrated (power stage, free wheeling diode, current sense resistor) Buck converter for up to 700mA

LITIX™ Power
Automotive Target Applications

Rear Light & Side Marker

Headlights Low Beam

LED

DRL

Interior Lighting

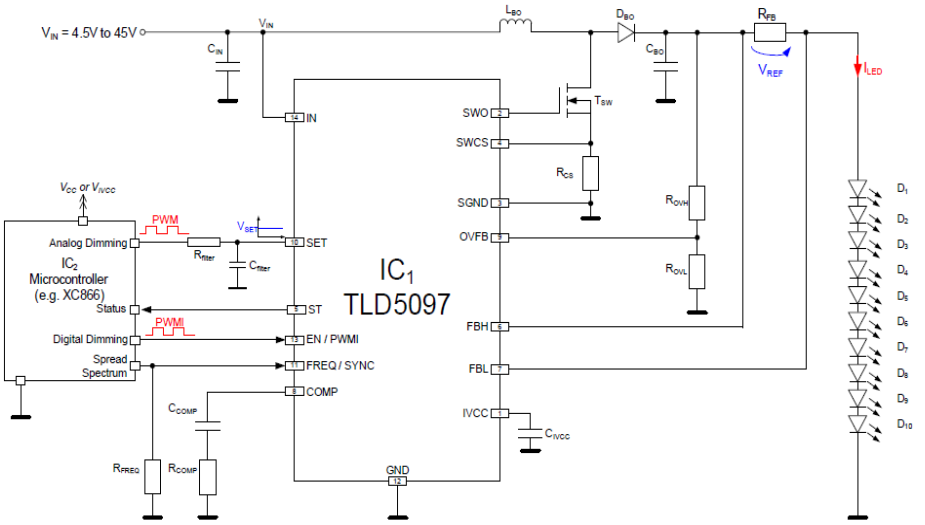
Picture source: Internet

LITIX™ Power - TLD5097EL
Overview on Product Features

Feature Set

- Wide Input Voltage Range from 4.5 V to 45 V
- Constant Current or Constant Voltage Regulation
- Drives LEDs in Boost, Buck, Buck-Boost, SEPIC and Flyback Topology
- Very Low Shutdown Current: Iq_OFF < 10 µA
- Flexible Switching Frequency Range, 100 kHz to 500 kHz
- Synchronization with external clock source
- PWM Dimming
- Analog Dimming feature to adjust average LED current
- Internal 5 V Low Drop Out Voltage Regulator
- Open Circuit Detection
- Output Overvoltage Protection
- Internal Soft Start
- Over Temperature Shutdown
- Wide LED current range via simple adaptation of external components
- High Side Current Sense

TLD5097EL



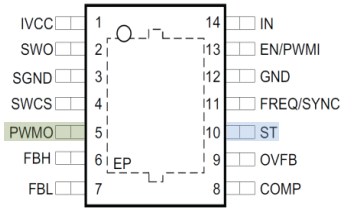
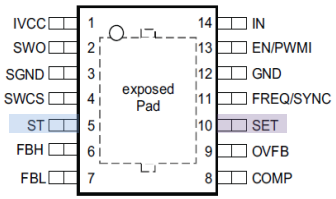
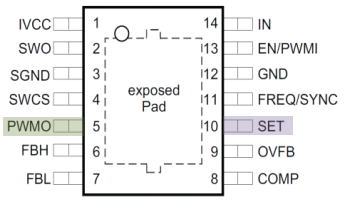
System Benefits

- Flexibility (topologies to address different LED architectures/applications)
- Good EMC performance
- Increased LED current accuracy
- Automotive Grade

Package

- SSOP-14, exposed pad
- 0.65mm pitch
- Small size: 5mm x 4mm
- Thermal Resistance … 47 K/W

LITIX™ Power
Overview Multitopology DCDC Controller TLD509x

		TLD5095	TLD5097 NEW	TLD5098
Topolgy	BOOST	YES	YES	YES
	BUCK	YES	YES	YES
	BUCK-BOOST	YES	YES	YES
Operating Voltage	MIN	4.75V	4.5V	4.5V
	MAX	45V	45V	45V
Integration		Controller (2 Gate Driver)	Controller (1 Gate Driver)	Controller (2 Gate Driver)
MAX LED Current		scaleable	scaleable	scaleable
MAX Output Voltage		45V	61V	61V
LED current accuracy		±3.3%	±3.3%	±3.3%
Operating Temperature	MIN	-40°C	-40°C	-40°C
	MAX	150°C	150°C	150°C
LED current Dimming	Digital (PWM)	YES, with dedicated PWM Gatedriver	YES	YES, with dedicated PWM Gatedriver
	Analog	NO	YES	YES
Switching Frequency	MIN	100kHz	100kHz	100kHz
	MAX	500kHz	500kHz	500kHz
	OPEN / VOUTOV	YES	YES	YES
Protection	SHORT of OUT	NO	NO	YES
	IC Overtemperature	YES	YES	YES
STATUS PIN		YES	YES	NO, but µC can monitor alternative Pins
ATV Grade / AEC Qualified		AEC Qualified RoHS	AEC Qualified RoHS	AEC Qualified RoHS
Package		PG-SSOP-14 ePad (Body: 5mm x 4mm)	PG-SSOP-14 ePad (Body: 5mm x 4mm)	PG-SSOP-14 ePad (Body: 5mm x 4mm)
Pinning				

LITIX™ Power
TLD5097EL - Application Boards Overview

- LITIX™ Power – General Overview
- LITIX™ Power – TLD5097EL Appboards w/o IO Filter Description
  - Boost to GND configuration (B2G) – Topology “BOOST”
  - Boost to Battery (B2B) – Topology “BUCK / BOOST”
  - SEPIC configuration – Topology “BUCK / BOOST”
- LITIX™ Power - Support Material Overview

LITIX™ Power
TLD5097 – Application Boards

- **Application Boards**:

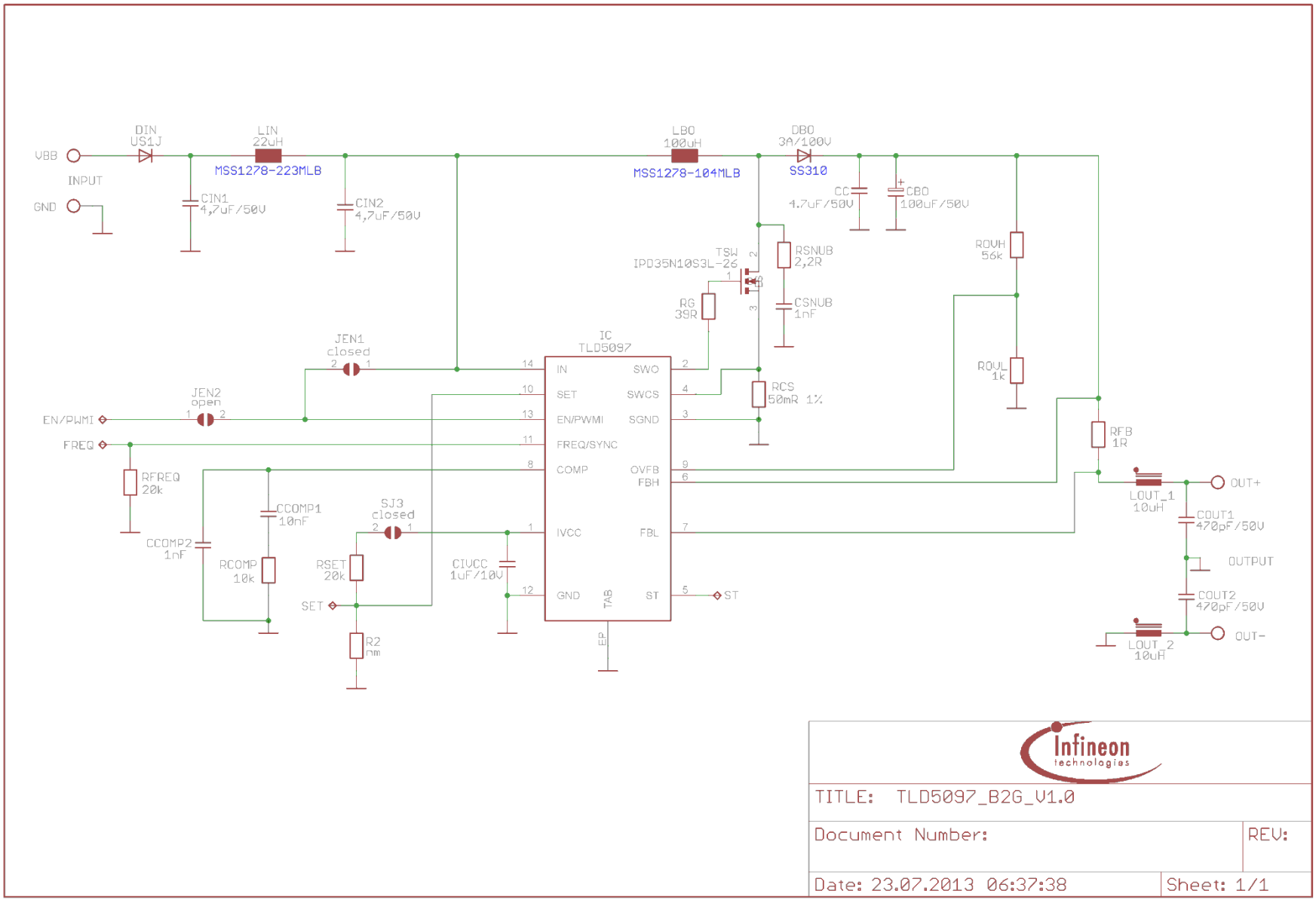
Sales Name of Demoboard	SP Number	Description
BOARD TLD5097 B2B	SP001157588	Boost to Battery Configuration
BOARD TLD5097 B2G	SP001157586	Boost to Ground Configuration
BOARD TLD5097 SEPIC	SP001157590	SEPIC Configuration

- The size of the application boards is 5 cm x 4.5 cm and the connections to the power supply and external load can be established with cables.
- The application boards in combination with real loads enable fast and realistic application prototyping and could be very beneficial for constructing initial system demonstrators.
- The layout of these boards is optimized for EMC and can be reused for customer applications.

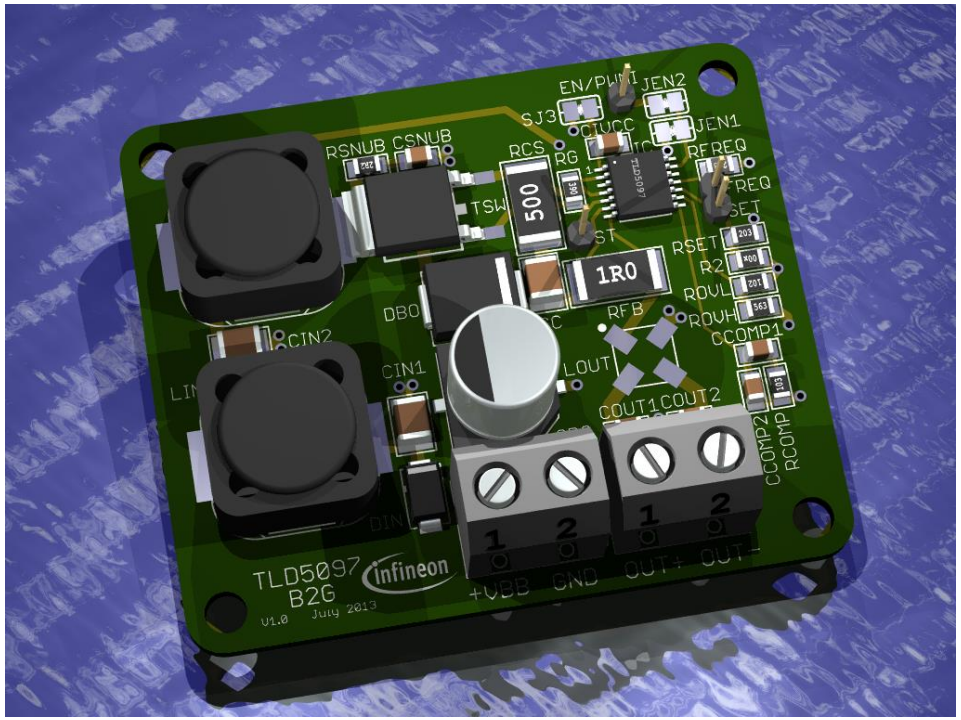
LITIX™ Power
TLD5097EL - Application Boards Overview

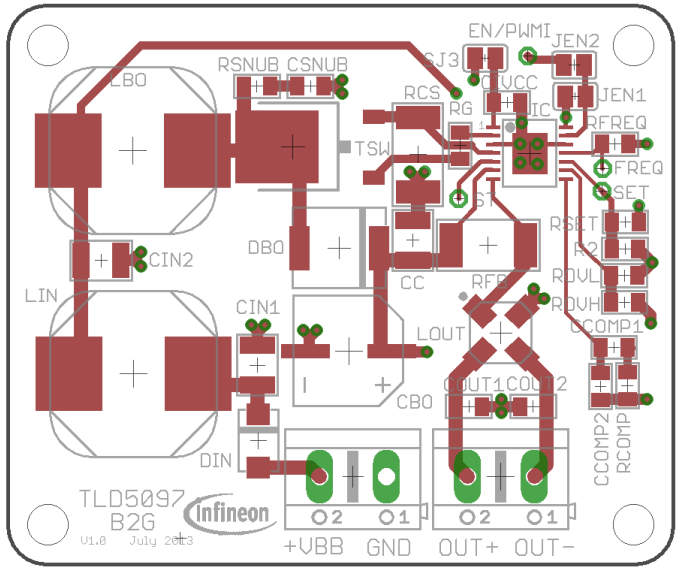
- LITIX™ Power – General Overview
- LITIX™ Power – TLD5097EL Appboards w/o IO Filter Description
  - Boost to GND configuration (B2G) – Topology “BOOST”
  - Boost to Battery (B2B) – Topology “BUCK / BOOST”
  - SEPIC configuration – Topology “BUCK / BOOST”
- LITIX™ Power - Support Material Overview

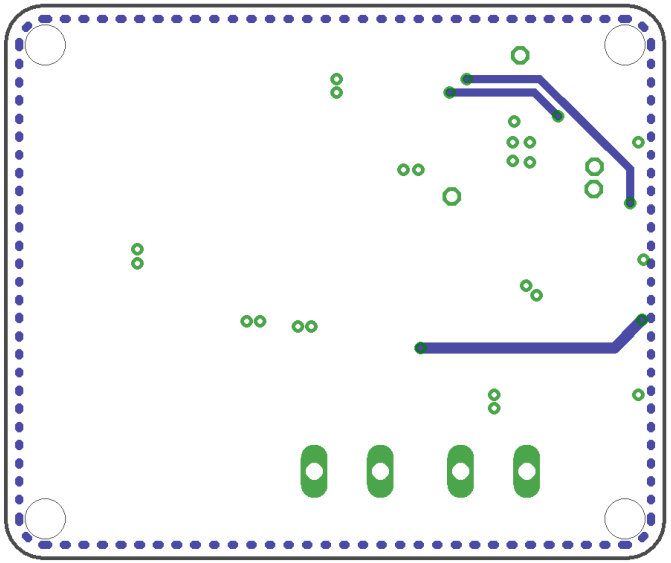
LITIX™ Power
Boost to Ground (B2G) - Schematic



LITIX™ Power
Boost to Ground (B2G) - Board







LITIX™ Power
Boost to Ground (B2G) – Bill of material

Part	Value	Package	Quantitiy	Distributer	Link / Order Nr.	Comment
Resistor						
R2	nm	0805				
RSNUB	2,2R	0805	1			
RCOMP	10k	0805	1			
RCS	50mR	2512	1			
RFB	1R	2512	1			
RFREQ, RSET	20k	0805	2			
RG	39R	0805	1			
ROVH	56k	0805	1			
ROVL	1k	0805	1			
Capacitor						
CBO	100uF/50V	Panasonik Fk Size F	1			
CSNUB	1nF	0805	1			
CC, CIN2, CIN3	4,7uF	1210	1			
CCOMP1	10nF	0805	1			
CCOMP2	1nF	0805	1			
CIVCC	1uF/10V	0805	1			
COUT1, COUT2	470pF	0805	2			
Infineon Chip						
IC	TLD5097	PG-SSOP-14	1	Infineon		
Tetspad						
EN/PWMI, FREQ, SET, ST		Measurementpoint	4			

LITIX™ Power
Boost to Ground (B2G) – Bill of material

Coil						
LBO	100uH	MSS1278-104MLB	1	Coilcraft		
LIN	22uH	MSS1278-223MLB	1	Coilcraft		
LOUT	10uH	LPD4012	1	Coilcraft		

Jumper						
SJ3, JEN1	closed	Solderjumper	2			
JEN2	open	Solderjumper	1			

Transistor						
TSW	IPD35N10S3L-26	TO-252-3	1	Infineon		

Diodes						
DBO	SS310	SMC	1			
DIN	US1J	SMA	1			

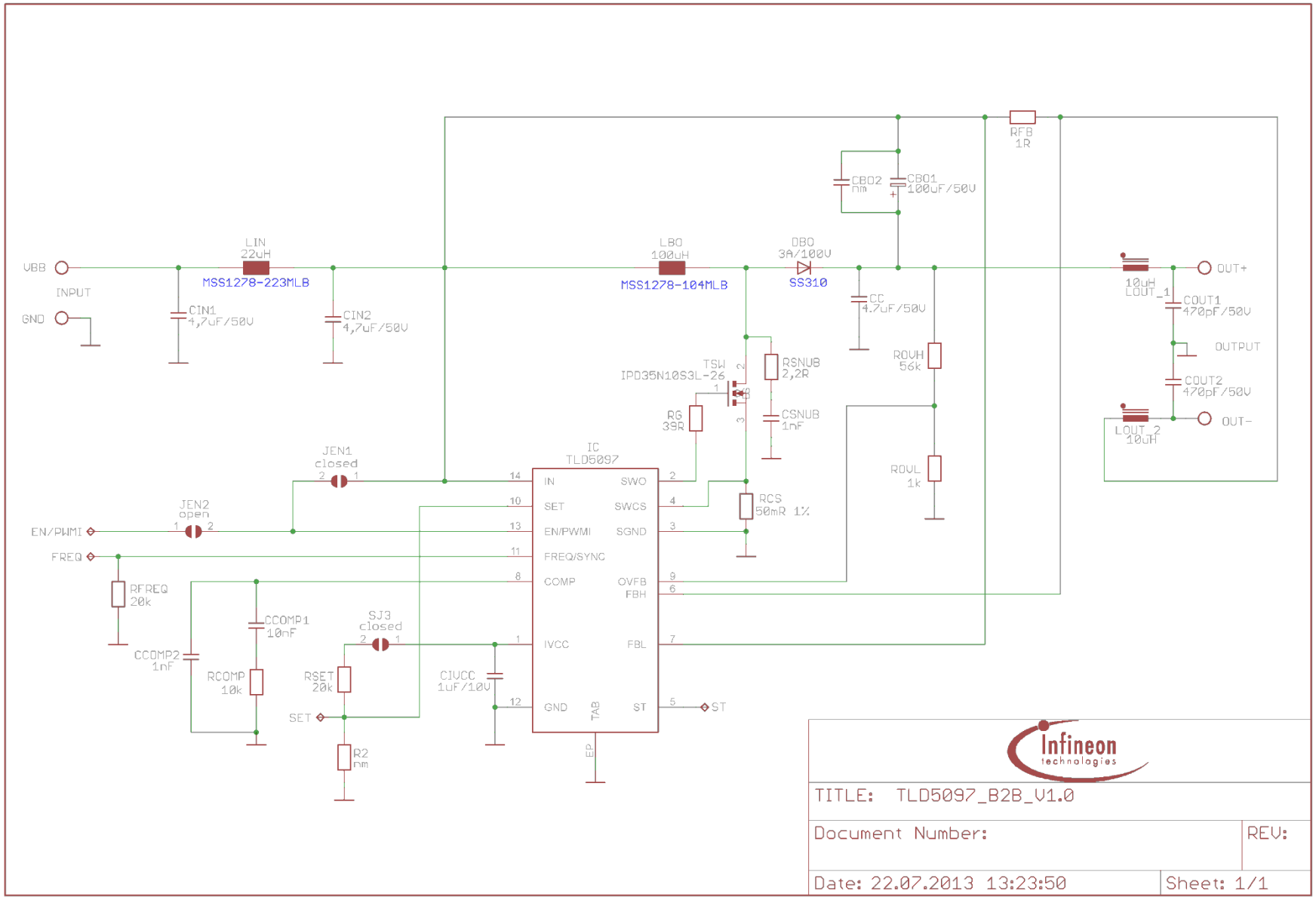
Connector						
INPUT, OUTPUT	AK500/2	2 polig	2	RS Components	361-7667	

Diverses						
Distanz	M3 15mm		4	RS	325-665	
Schraube	M3 6mm		4	RS	482-7691	

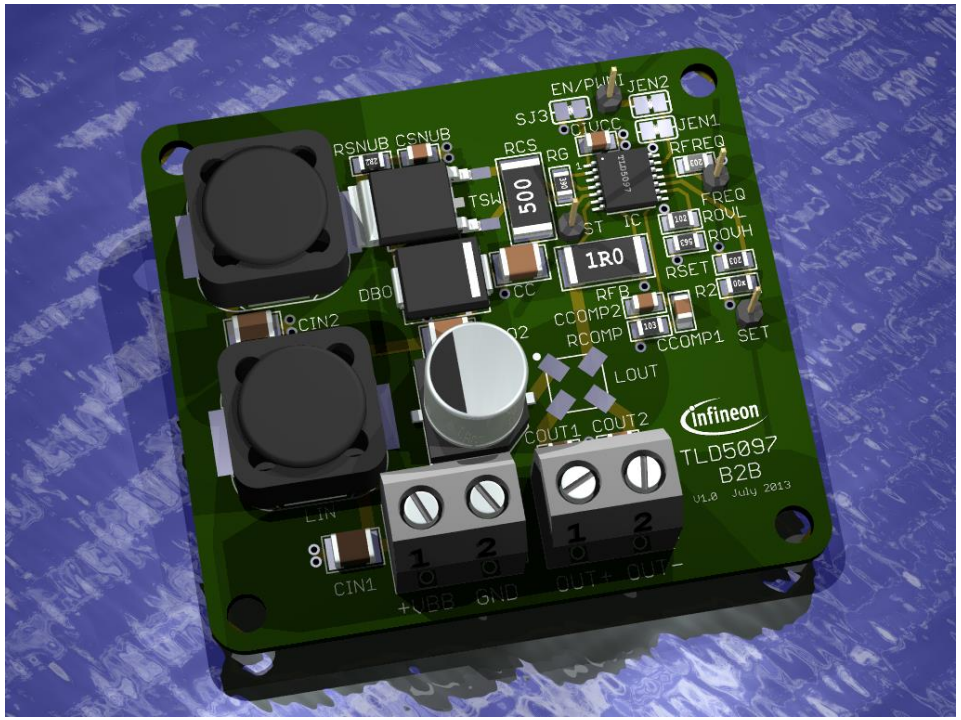
LITIX™ Power
TLD5097EL - Application Boards Overview

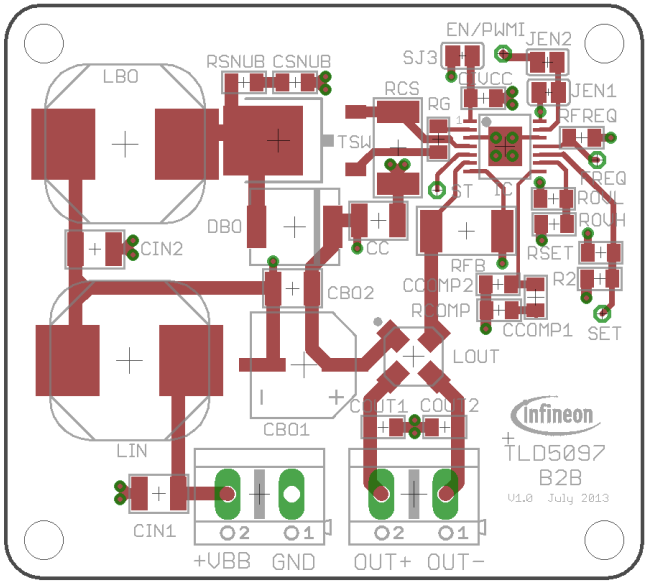
- LITIX™ Power – General Overview
- LITIX™ Power – TLD5097EL Appboards w/o IO Filter Description
  - Boost to GND configuration (B2G) – Topology “BOOST”
  - Boost to Battery (B2B) – Topology “BUCK / BOOST”
  - SEPIC configuration – Topology “BUCK / BOOST”
- LITIX™ Power - Support Material Overview

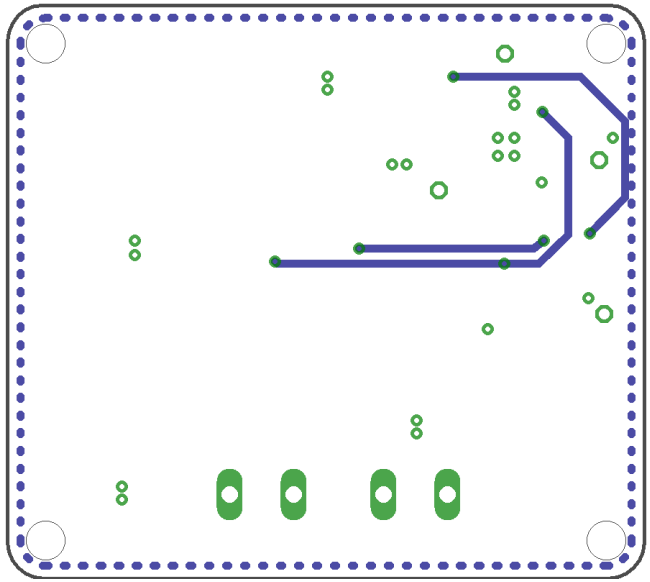
LITIX™ Power
Boost to Battery (B2B) - Schematic



LITIX™ Power
Boost to Battery (B2B) - Board







LITIX™ Power
Boost to Battery (B2B) – Bill of material

Part	Value	Package	Quantitiy	Distributer	Link / Order Nr.	Comment
Resistor						
R2	nm	0805				
RSNUB	2,2R	0805	1			
RCOMP	10k	0805	1			
RCS	50mR	2512	1			
RFB	1R	2512	1			
RFREQ, RSET	20k	0805	2			
RG	39R	0805	1			
ROVH	56k	0805	1			
ROVL	1k	0805	1			
Capacitor						
CBO1	100uF/50V	Panasonik Fk Size F	1			
CBO2	nm	1210				
CSNUB	1nF	0805				
CC, CIN2, CIN3	4,7uF	1210	1			
CCOMP1	10nF	0805	1			
CCOMP2	1nF	0805	1			
CIVCC	1uF/10V	0805	1			
COUT1, COUT2	470pF	0805	2			
Infineon Chip						
IC	TLD5097	PG-SSOP-14	1	Infineon		
Tetspad						
EN/PWMI, FREQ, SET, ST		Measurementpoint	4			

LITIX™ Power
Boost to Battery (B2B) – Bill of material

Coil						
LBO	100uH	MSS1278-104MLB	1	Coilcraft		
LIN	22uH	MSS1278-223MLB	1	Coilcraft		
LOUT	10uH	LPD4012	1	Coilcraft		

Jumper						
SJ3, JEN1	closed	Solderjumper	2			
JEN2	open	Solderjumper	1			

Transistor						
TSW	IPD35N10S3L-26	TO-252-3	1	Infineon		

Diodes						
DBO	SS310	SMC	1			

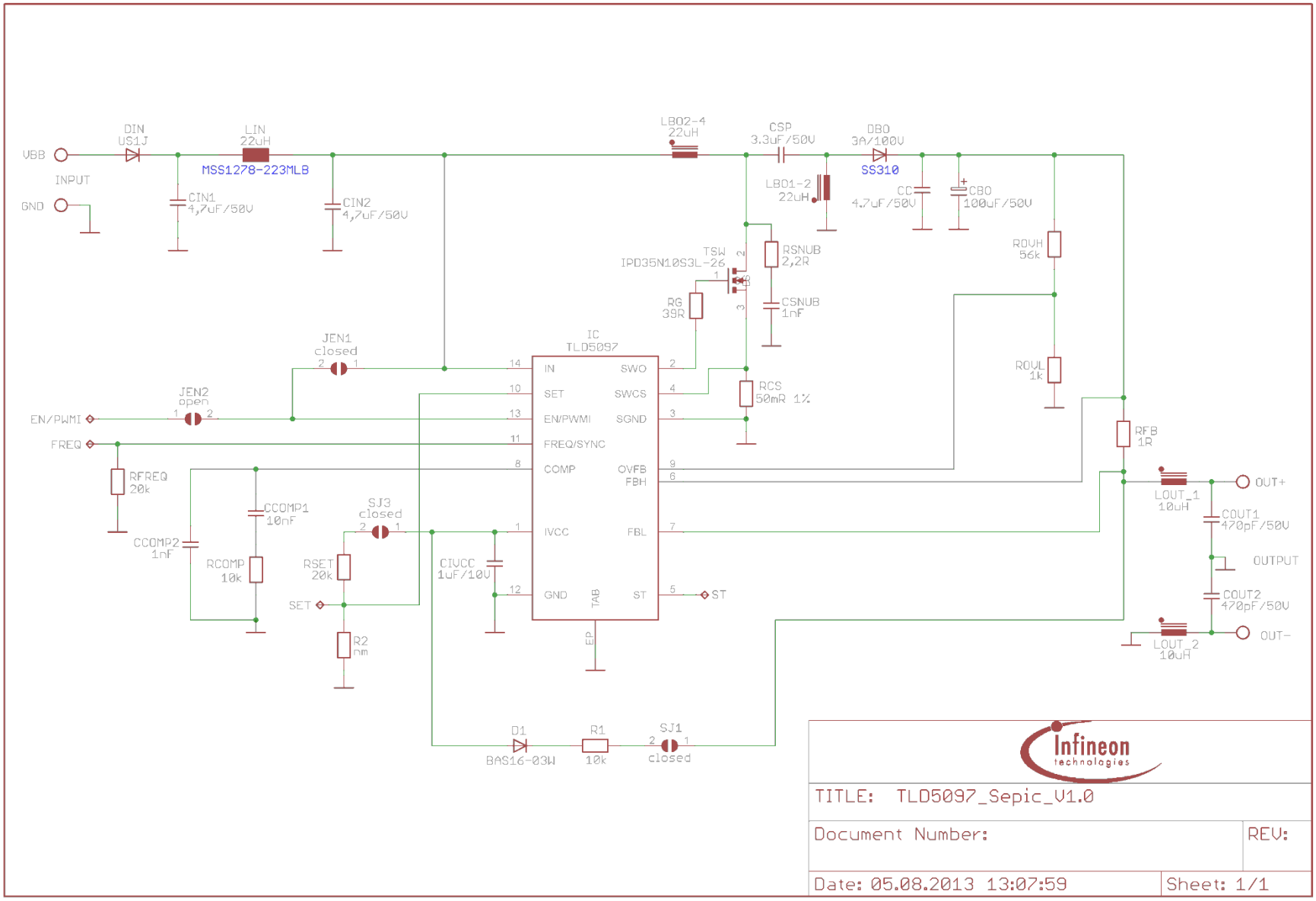
Connector						
INPUT, OUTPUT	AK500/2	2 polig	2	RS Components	361-7667	

Diverses						
Distanz	M3 15mm		4	RS	325-665	
Schraube	M3 6mm		4	RS	482-7691	

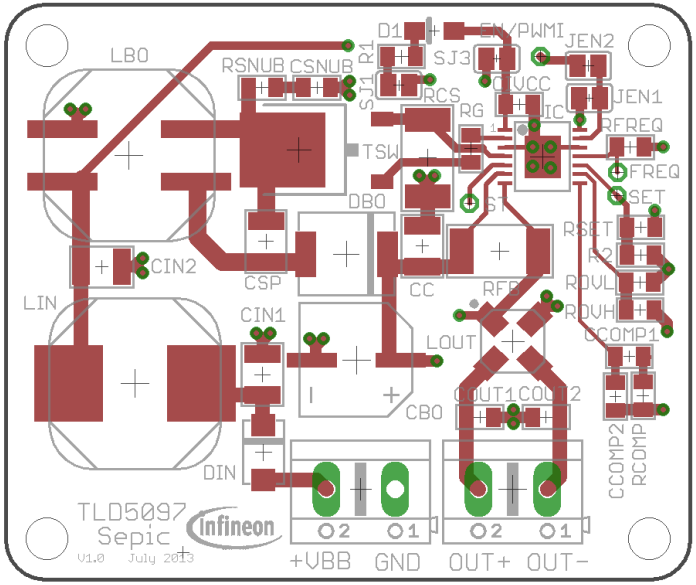
LITIX™ Power
TLD5097EL - Application Boards Overview

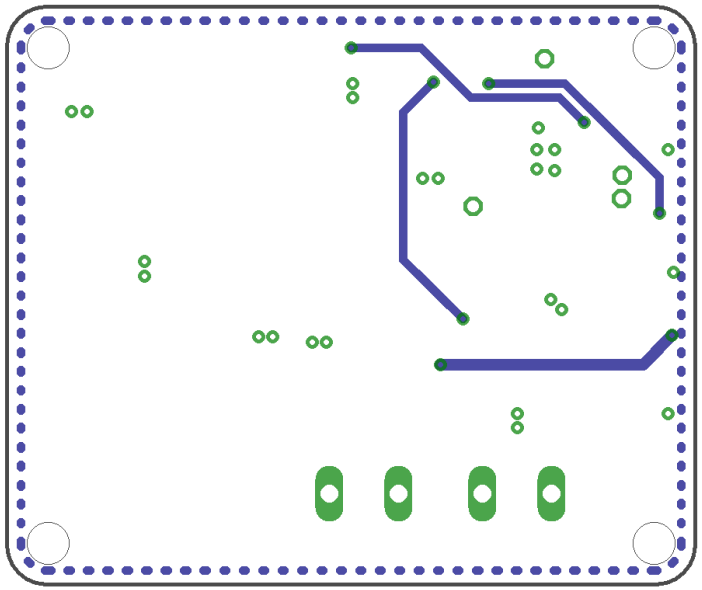
- LITIX™ Power – General Overview
- LITIX™ Power – TLD5097EL Appboards w/o IO Filter Description
  - Boost to GND configuration (B2G) – Topology “BOOST”
  - Boost to Battery (B2B) – Topology “BUCK / BOOST”
  - SEPIC configuration – Topology “BUCK / BOOST”
- LITIX™ Power - Support Material Overview

LITIX™ Power
SEPIC configuration - Schematic



LITIX™ Power
SEPIC configuration - Board





LITIX™ Power
SEPIC configuration– Bill of material

Part	Value	Package	Quantitiy	Distributer	Link / Order Nr.	Comment
Resistor						
R2	nm	0805				
R1	10k	0805	1			
RSNUB	2,2R	0805	1			
RCOMP	10k	0805	1			
RCS	50mR	2512	1			
RFB	1R	2512	1			
RFREQ, RSET	20k	0805	2			
RG	39R	0805	1			
ROVH	56k	0805	1			
ROVL	1k	0805	1			
Capacitor						
CBO	100uF/50V	Panasonik Fk Size F	1			
CSP	3,3uF/50V	1210	1			
CSNUB	1nF	0805	1			
CC, CIN2, CIN3	4,7uF	1210	1			
CCOMP1	10nF	0805	1			
CCOMP2	1nF	0805	1			
CIVCC	1uF/10V	0805	1			
COUT1, COUT2	470pF	0805	2			
Infineon Chip						
IC	TLD5097	PG-SSOP-14	1	Infineon		
Tetspad						
EN/PWMI, FREQ, SET, ST		Messpin	4			

LITIX™ Power
SEPIC configuration– Bill of material

Coil						
LBO	22uH	MSD1278-23MLB	1	Coilcraft		Common Mode
LIN	22uH	MSS1278-223MLB	1	Coilcraft		
LOUT	10uH	LPD4012	1	Coilcraft		Common Mode

Jumper						
SJ3, JEN1, SJ1	closed	Solderjumper	3			
JEN2	open	Solderjumper	1			

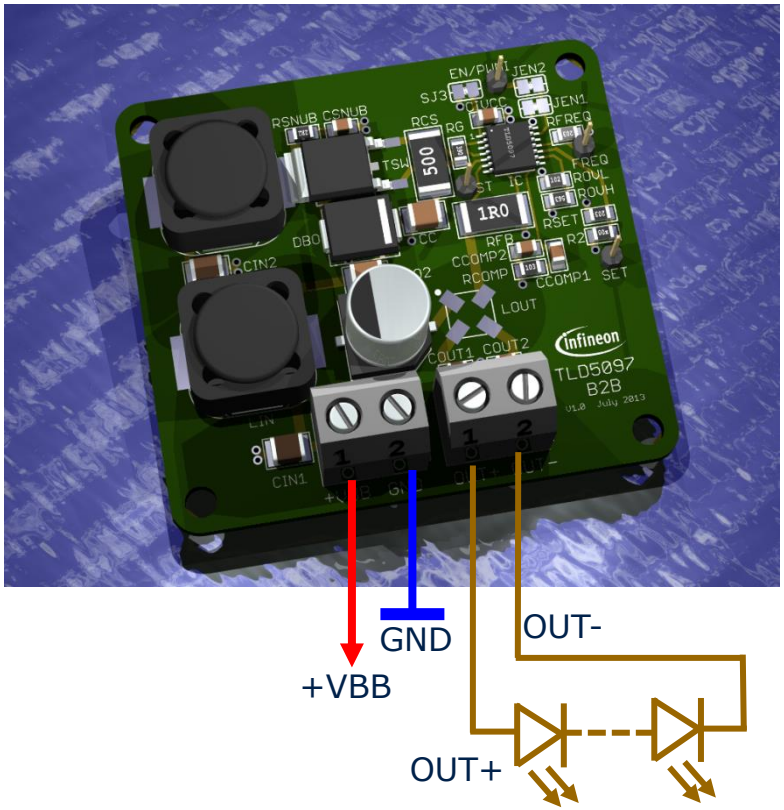
Transistor						
TSW	IPD35N10S3L-26	TO-252-3	1	Infineon		

Diodes						
DBO	SS310	SMC	1			
D1	BAS16-03W	SOD323	1			
DIN	US1J	SMA	1			

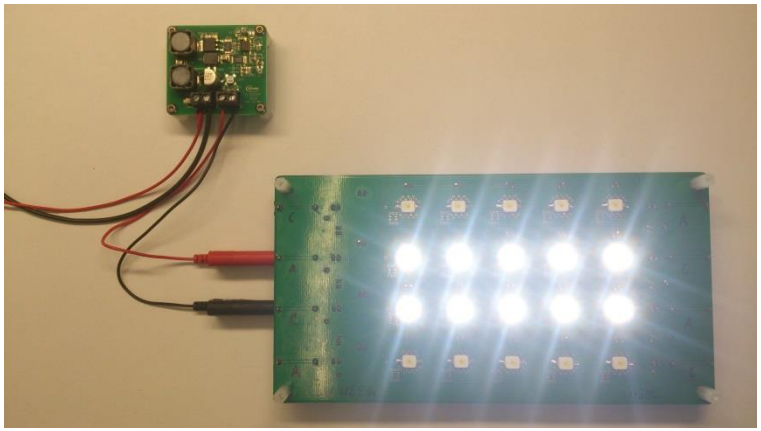
Connector						
INPUT, OUTPUT	AK500/2	2 polig	2	RS Components	361-7667	

Diverses						
Distanz	M3 15mm		4	RS	325-665	
Schraube	M3 6mm		4	RS	482-7691	

LITIX™ Power
Getting started – Example on **B2B Board**



Example: TLD5097 Application Board in combination with a general purpose load board!



LITIX™ Power
TLD5097EL - Application Boards Overview

- LITIX™ Power – General Overview
- LITIX™ Power – TLD5097EL Appboards w/o IO Filter Description
  - Boost to GND configuration (B2G) – Topology “BOOST”
  - Boost to Battery (B2B) – Topology “BUCK / BOOST”
  - SEPIC configuration – Topology “BUCK / BOOST”
- LITIX™ Power - Support Material Overview

Available Appboards

Sales Name of Demoboard	SP Number	Description
APPBOARD TLD5098EL VER1	SP000954242	Constant Voltage Mode
APPBOARD TLD5098EL VER2	SP000954244	Boost to Ground Configuration w/ short to ground protection
APPBOARD TLD5098EL VER3	SP000954246	Boost to Battery Configuration
APPBOARD TLD5098EL VER4	SP000954248	SEPIC Configuration
APPBOARD TLD5098EL V5	SP000984908	Boost to Ground Configuration w/ short to ground protection & EMC filter
APPBOARD TLD5098EL V6	SP000984910	Boost to Battery Configuration with EMC filter
APPBOARD TLD5098EL V7	SP000984912	SEPIC Configuration with EMC filter
BOARD TLD5097 B2B	SP001157588	Boost to Battery Configuration
BOARD TLD5097 B2G	SP001157586	Boost to Ground Configuration
BOARD TLD5097 SEPIC	SP001157590	SEPIC Configuration

www.infineon.com/litix-power-appboards

Available Demoboards

Sales Name of Demoboard	SP Number	Description
Demoboard TLD5045EJ	SP000924382	Buck mode
Demoboard TLD5095EL Ver1	SP000760364	Boost to GND (default), Sepic & Constant Voltage Mode possible
Demoboard TLD5095EL Ver2	SP000845642	Boost to Battery (default), Constant Voltage Mode possible

www.infineon.com/litix-power-demoboards

Other design in support material

- Data Sheets & Application Note
- Simulation Models
- EMC Test Reports
- Excel Calculation Tool for TLD509xEL available on request

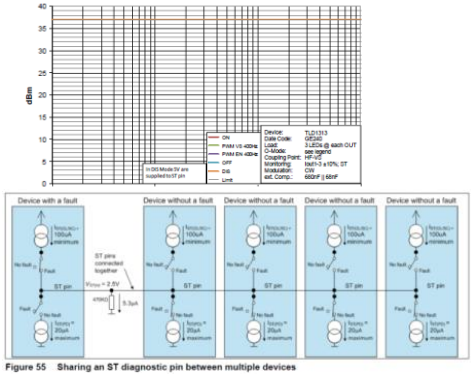


Figure 55 Sharing an ST diagnostic pin between multiple devices

Thank you very much for your attention

For more information, please visit:

http://www.infineon.com/LITIX

ENERGY EFFICIENCY
MOBILITY
SECURITY

Innovative semiconductor solutions for energy efficiency, mobility and security.