Version 1.2, Aug 2004

Datasheet

DS-CoreControl-TDA21107

TDA21107

Published by Infineon Technologies AG
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Power Management & Drive

Never stop thinking.

Contents:

High speed Driver with bootstrapping for dual Power MOSFETs

P-DSO-8

Features:

- Fast rise and fall times for frequencies up to 1 MHz
- Adjustable High Side MOSFET gate drive voltage via external voltage supply to BOOT for optimizing ON losses and gate drive losses (5V to 12V is recommended)
- Prevents from cross-conducting by adaptive gate drive control
- Supports shut-down mode for very low quiescent current through three-state input
- Compatible to standard PWM controller ICs (IFX, Intersil, Analog Devices, Richtek)
- Floating High Side MOSFET drive
- Power-on Overvoltage Protection
- Footprint compatible to ADP3418
- Ideal for multi-phase Desktop CPU supplies on motherboards and VRM´s

Application:

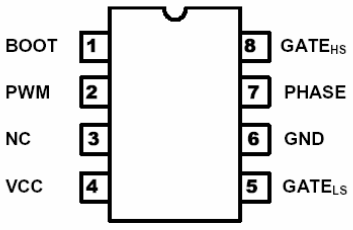
- Voltage Regulator Modules
- Low Output Voltage High Output Current DC-DC Converters
- Half-Bridge Class D Amplifier

Type	Package	Marking	Ordering Code
TDA21107	P-DSOP-8	21107	Q67042-S4251

Pinout Drawing and Description:

Pinout

Top View



Number	Name	Description
1	BOOT	Floating bootstrap pin. To be connected to the external bootstrap capacitor to generate the gate drive voltage for the high side N-Channel MOSFET
2	PWM	Input for the PWM signal from controller
3	NC	No Connection
4	VCC	Supply voltage
5	GATE$_{LS}$	Gate drive output for the N-Channel Low Side MOSFET
6	GND	Ground
7	PHASE	To be connected to the junction of the High Side and the Low Side MOSFET
8	GATE$_{HS}$	Gate drive output for the N-Channel High side MOSFET

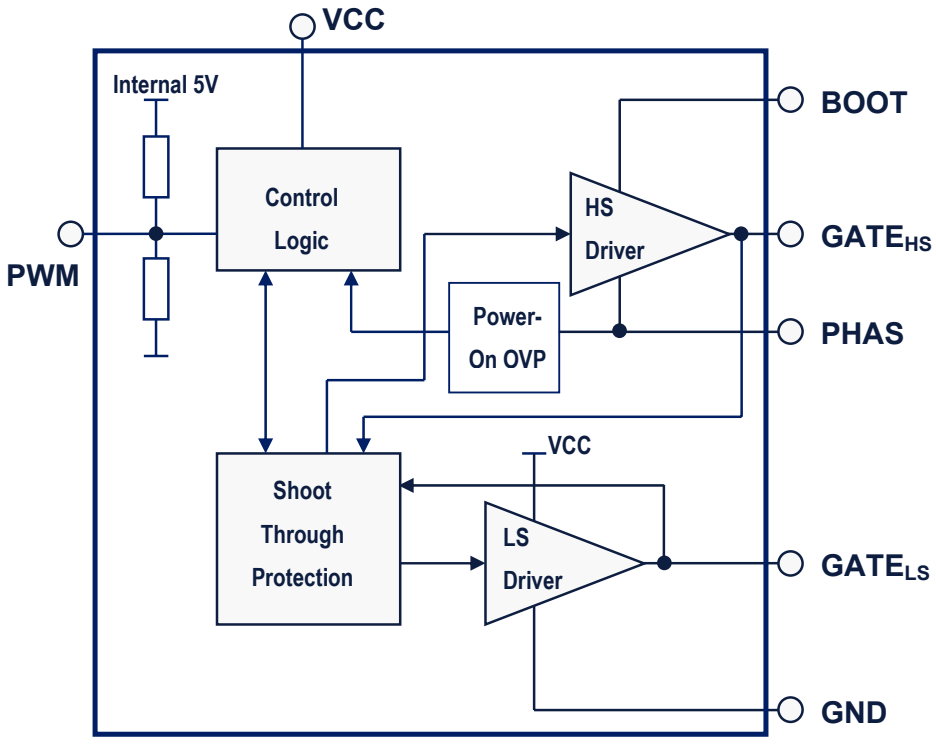
General Description

The dual high speed driver is designed to drive a wide range of N-Channel low side and N-Channel high side MOSFETs with varying gate charges. It has a small propagation delay from PWM input pin to $GATE_{HS}$ and $GATE_{LS}$, short rise and fall times and the same pin configuration as the ADP3418. In addition it provides several protection features as well as a shut down mode for efficiency reasons.

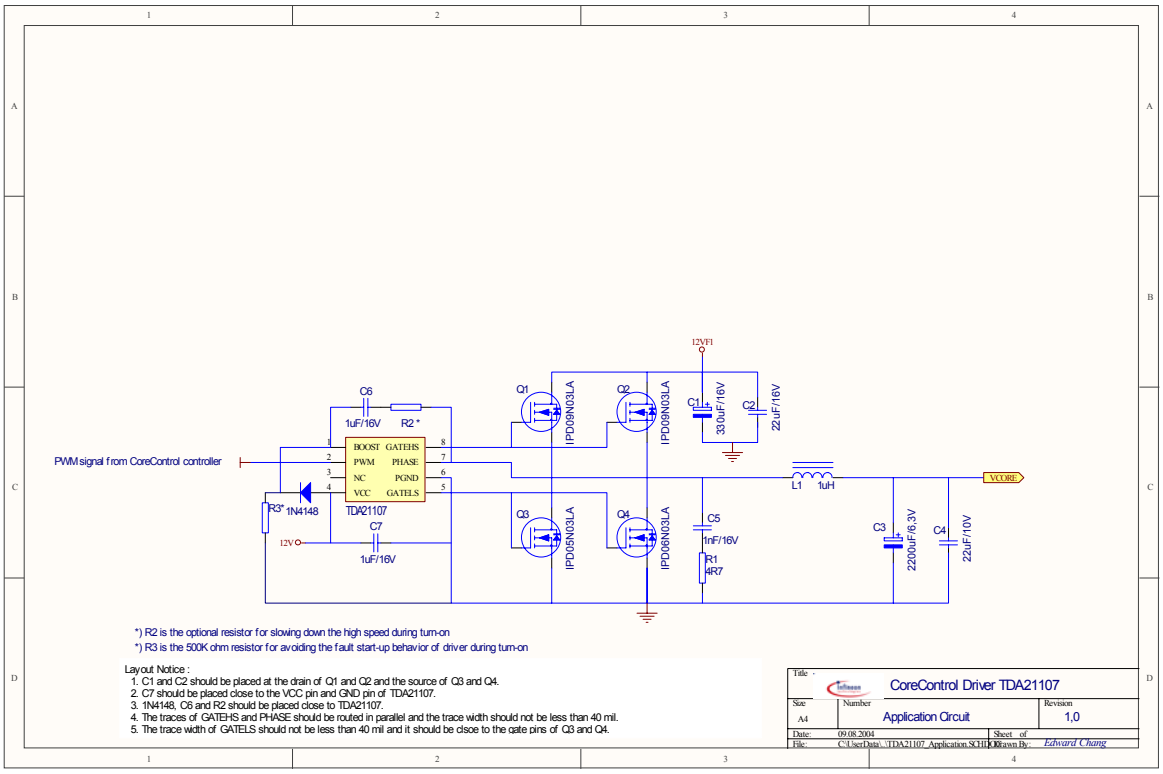
Target application

The dual high speed driver is designed to work well in half-bridge type circuits where dual N-Channel MOSFETs are utilized. A circuit designer can fully take advantage of the driver´s capabilities in high-efficiency, high-density synchronous DC/DC converters that operate at high switching frequencies, e.g. in multi-phase converters for CPU supplies on motherboards and VRM´s but also in motor drive and half bridge class-D amplifier type applications.

Block Diagram



Application Circuit



Absolute Maximum Ratings

At Tj = 25 °C, unless otherwise specified

Parameter	Symbol	Value		Unit
		Min	MAX	
Voltage supplied to 'VCC' pin; DC	V_{VCC}	-0.3	15	V
Voltage supplied to 'PWM' pin	V_{PWM}	-0.3	7	
Voltage supplied to 'BOOT' pin referenced to 'PHASE'	$V_{BOOT} - V_{PHASE}$	-0.3	15	
Voltage supplied to 'BOOT' pin referenced to 'GND'	V_{BOOT}	-0.3	30	
Voltage rating at 'PHASE' pin,	V_{PHASE}	-4	15	
Voltage supplied to $GATE_{HS}$ pin referenced to 'PHASE	V_{GATEHS}	V_{PHASE} - 0.3	V_{BOOT} +0.3	
Voltage supplied to $GATE_{LS}$ pin referenced to 'GND'	V_{GATELS}	-0.3	V_{VCC} +0.3	
Junction temperature	T_J	0	150	°C
Storage temperature	T_S	-40	150	
Lead temperature (Soldering, 10 seconds)			260	
ESD Rating; Human Body Model			2	KV
Machine Mode			200	V
IEC climatic category; DIN EN 60068-1	55/150/56			

Thermal Characteristic

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction-soldering point			90		K/W
Thermal resistance, junction-ambient			125		

Operating Conditions

At Tj = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Voltage supplied to 'VCC' pins	V_{VCC}		10.8	12.0	13.2	V
Input signal transition frequency	f		50		500	KHz
Power dissipation	P_{TOT}	T_A = 25 °C, T_J = 125 °C		0.8		W
Junction temperature	T_J		0		125	°C
Ambient temperature	T_A		0		70	°C

Electrical Characteristic

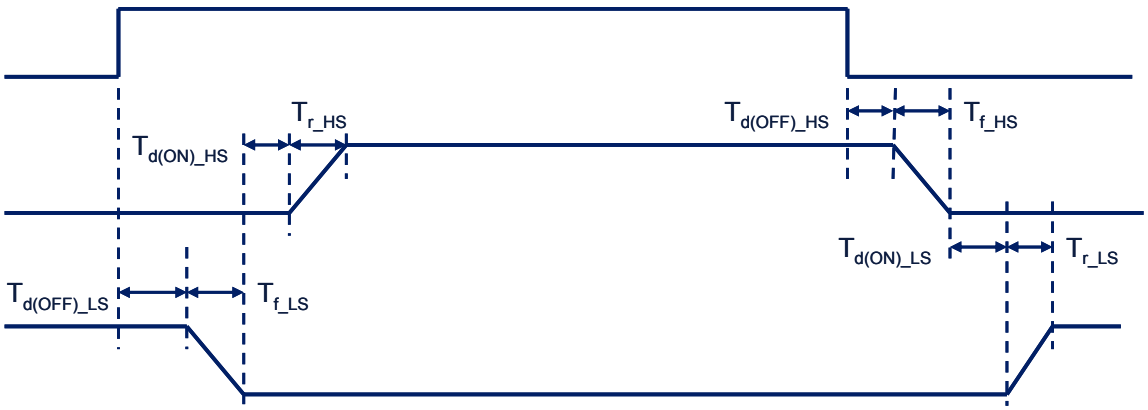
At Tj = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Supply Characteristic						
VCC supply current	I_{VCC}	V_{VCC} = 12 V V_{PWM} = 0V		5	7	mA
Under-voltage lockout		V_{VCC} rising threshold	8.6	9.4	10.2	V
Under-voltage lockout		V_{VCC} falling threshold	7.25	8.05	8.85	
Input Characteristic						
Current in 'PWM' pin	I_{PWM_L}	$V_{\_PWM}$ = 0 V	-80	-110	-140	µA
Current in 'PWM' pin	I_{PWM_H}	$V_{\_PWM}$ = 5 V	80	110	140	
PWM pin open	V_{PWM_O}		2.2	2.5	2.8	V
PWM Low level	V_{PWM_L}		1.2	1.4	1.5	
PWM High level	V_{PWM_H}		3.0	3.5	3.8	

At Tj = 25 °C, unless otherwise specified

Dynamic Characteristic						
Turn-on propagation Delay High Side	$t_{d(ON)\_HS}$	P_{PVCC} = V_{VCC}= 12 V C_{ISS} = 3000 pF		40		ns
Turn-off propagation delay High Side	$t_{d(OFF)\_HS}$			30		
Rise time High Side	t_{r_HS}			30		
Fall time High Side	t_{f_HS}			40		
Turn-on propagation Delay Low Side	$t_{d(ON)\_LS}$			35		
Turn-off propagation delay Low Side	$t_{d(OFF)\_LS}$			30		
Rise time Low Side	t_{r_LS}			30		
Fall time Low Side	t_{f_LS}			30		

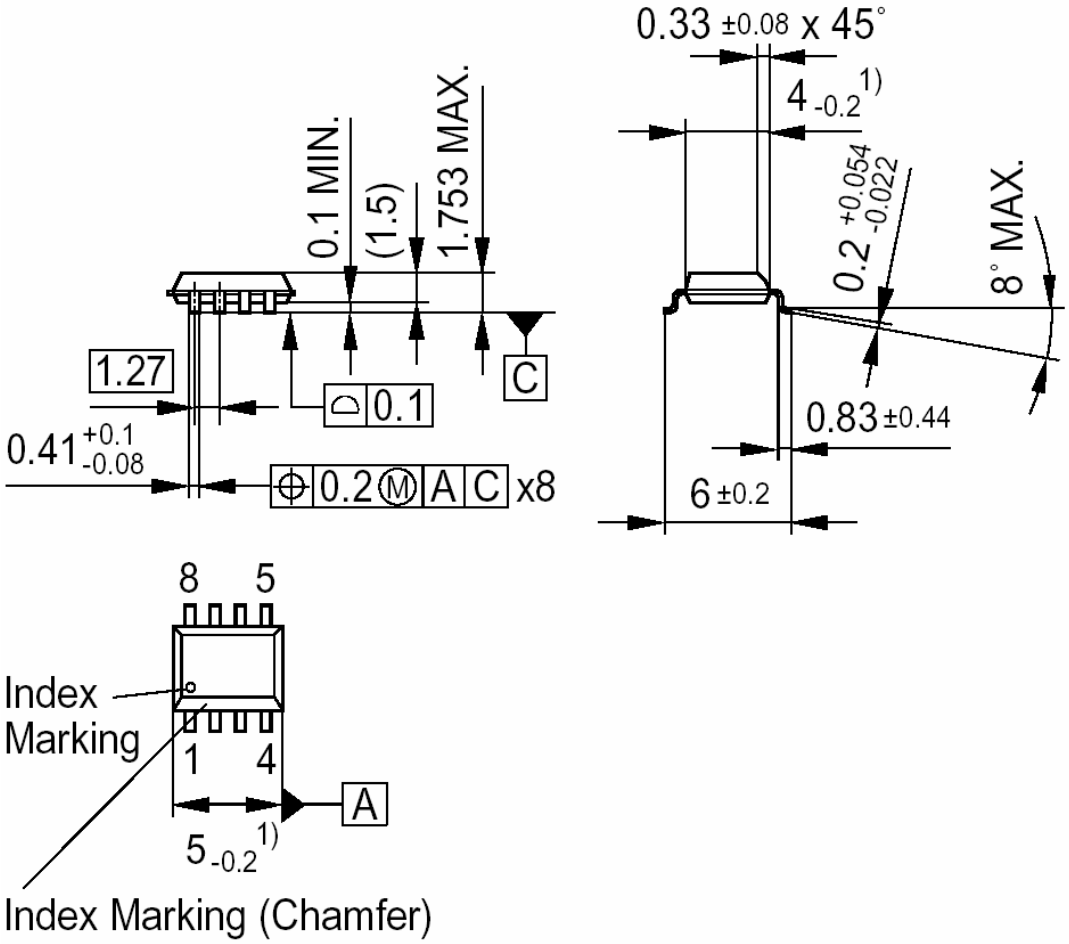
Timing diagram



At Tj = 25 °C, unless otherwise specified

Parameter		Conditions	Values			Unit
			Min.	Typ.	Max.	
Output Characteristic High Side (HS) and Low Side (LS), ensured by design						
Output Reistance	HS; Source	V_{PVCC} = V_{VCC}= 12 V		2		Ω
	HS; Sink			1.5		
	LS; Source			1.6		
	LS; Sink			1.2		

Package Drawing P-DSO-8



1) Does not include plastic or metal protrusion of 0.15 max. per side

Footprint Drawing P-DSO-8

e	A	L	B
1.27 mm	5.69 mm	1.31 mm	0.65 mm

Revision History			
Datasheet DS-CoreControl-TDA21107			
Actual Release: V1.1 Date: 22.03.2005		Previous Release: V1.0	Date: 10.08.2004
Page of actual Rel.	Page of prev. Rel.	Subjects changed since last release	
9	9	Add $t_{d(OFF)\_HS}$ = 30 ns and $t_{d(OFF)\_LS}$ = 30 ns	

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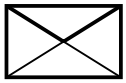

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