Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

Infineon Technologies
TDA21102

For any questions, you can email us directly:
sales@integrated-circuit.com

High speed Driver with bootstrapping for dual Power MOSFETs

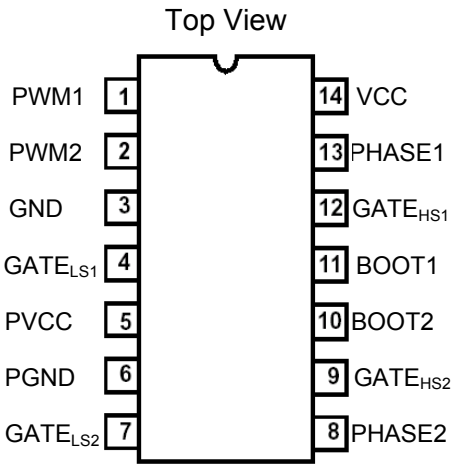
P-DSO-14-3

Features

- Fast rise and fall times for frequencies up to 2 MHz
- Capable of sinking more than 4 A peak current for lowest switching losses
- Charges the High Side and Low Side MOSFET´s gate to 5..12 V according to PVCC setting.
- Adjustable High Side and Low Side MOSFET gate drive voltage via PVCC pin for optimizing ON losses and gate drive losses
- Integrates the bootstrap diode for reducing the part count
- Prevents from cross-conducting by adaptive gate drive control
- High voltage rating on Phase node
- Supports shut-down mode for very low quiescent current through three-state input
- Compatible to standard PWM controller ICs (Intersil, Analog Devices)
- Floating High Side MOSFET drive
- Ideal for multi-phase Desktop CPU supplies on motherboards and VRM´s

Type	Package	Marking	Ordering Code
TDA21102	P-DSO-14-3	21102	Q67042-S4244

Pinout & Description



Number	Name	Description
1	PWM1	Input for the PWM1 controller signal
2	PWM2	Input for the PWM2 controller signal
3	GND	Ground
4	GATE$_{LS1}$	Gate drive output for the N-Channel Low Side MOSFET 1.
5	PVCC	Input to adjust the High Side gate drive
6	PGND	Power ground return for the Low Side Drivers
7	GATE$_{LS2}$	Gate drive output for the N-Channel Low Side MOSFET 2.
8	PHASE2	To be connected to the junction of the High Side and the Low Side MOSFET 2
9	GATE$_{HS2}$	Gate drive output for the N-Channel High Side MOSFET 2.
10	BOOT2	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.
11	BOOT1	Floating bootstrap pin. To be connected to the external bootstrap capacitor to generate the gate drive voltage for the High Side N-Channel MOSFET 1.
12	GATE$_{HS1}$	Gate drive output for the N-Channel High Side MOSFET 1.
13	PHASE1	To be connected to the junction of the High Side and the Low Side MOSFET 1
14	VCC	Supply Voltage

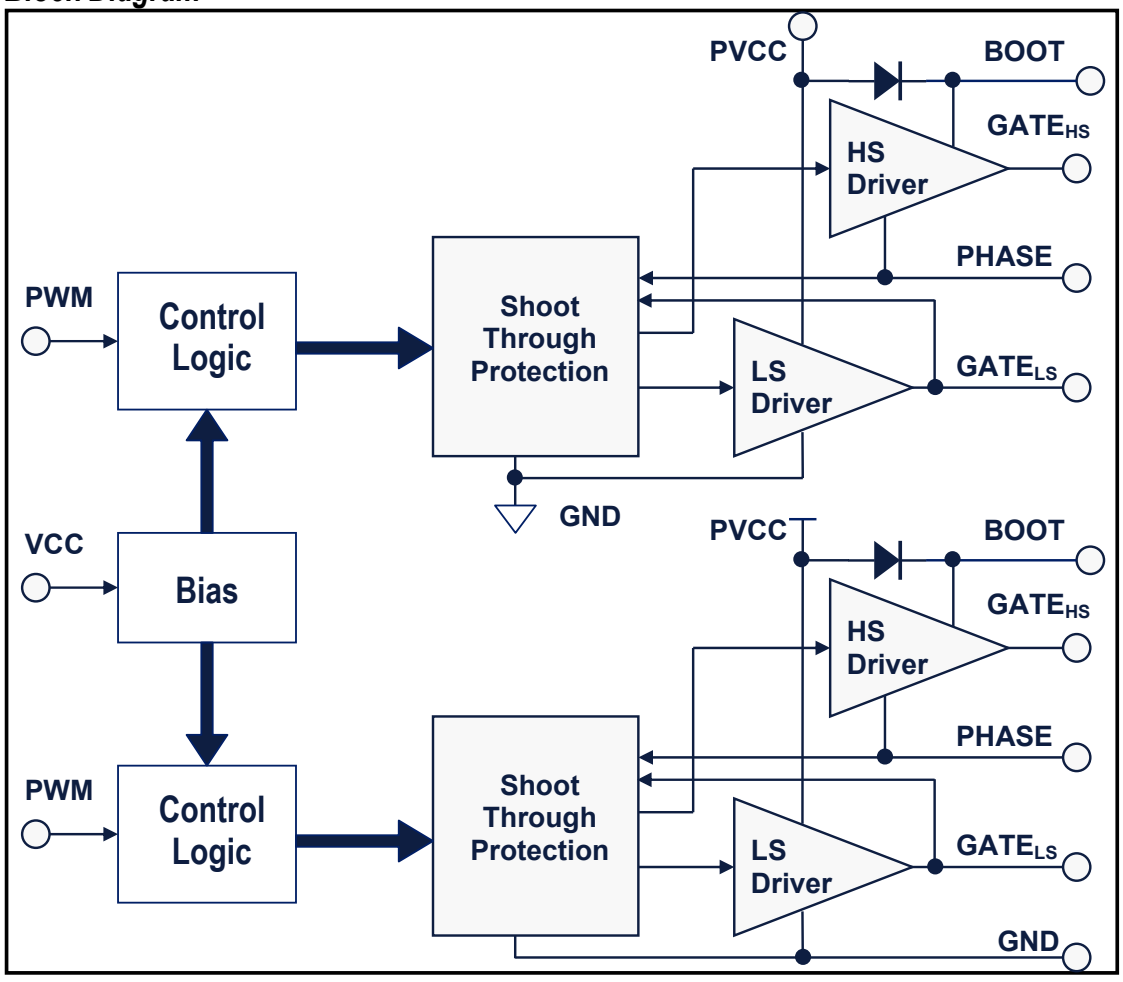
General Description

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 input to output, short rise and fall times and the same pin configuration as the HIP6602B. In addition it provides several protection features as well as a shut down mode for efficiency reasons. The high breakdown voltage makes it suitable for mobile applications.

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 class-D amplifier type applications.

Block Diagram



Absolute Maximum Ratings

At Tj = 25 °C, unless otherwise specified

Parameter	Symbol	Value		Unit
		Min.	Max.	
Voltage supplied to 'VCC' pin	V_{VCC}	-0.3	25	V
Voltage supplied to 'PVCC' pin	V_{PVCC}	-0.3	25	
Voltage supplied to 'PWM' pin	V_{PWM}	-0.3	5.5	
Voltage supplied to 'BOOT' pin referenced to 'PHASE'	$V_{BOOT} - V_{PHASE}$	-0.3	25	
Voltage rating at 'PHASE' pin, DC	V_{PHASE}	-1	25	
Voltage rating at 'PHASE' pin, t_{pulse_max} =500ns Max Duty Cycle = 2%		-20	30	
Voltage supplied to $GATE_{HS}$ pin referenced to 'PHASE' T_{pulse_max} < 100ns, E < 2uJ	V_{GATEHS}	-3.5	V_{BOOT} +0.3	
Voltage supplied to $GATE_{LS}$ pin referenced to 'GND' T_{pulse_max} < 100ns, E < 2uJ	V_{GATELS}	-5	V_{VCC} +0.3	
Junction temperature	T_J	-25	150	°C
Storage temperature	T_S	-55	150	
ESD Rating; Human Body Model			4	kV
IEC climatic category; DIN EN 60068-1		55/150/56		-

Thermal Characteristic

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction-solder joint (pin 4)	Rth-JS		40.5		K/W
Thermal resistance, junction-case	Rth-JC		44.7		
Thermal resistance, junction-ambient	Rth-JA		116.2		

Electrical Characteristic

At Tj = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Supply Characteristic						
Bias supply current	I_{VCC}	f = 1 MHz, NO LOAD $V_{PVCC} = V_{VCC} = 12$ V		1.3	1.8	mA
Quiescent current	I_{VCCQ}	1.8 V ≤ V_{PWM} ≤ 3.0 V		3.8	4.9	
Power supply current	I_{PVCC}	f = 1 MHz, NO LOAD $V_{PVCC} = V_{VCC} = 12$ V		25	33	
Under-voltage lockout		V_{VCC} rising threshold	9.7	10.1	10.5	V
Under-voltage lockout		V_{VCC} falling threshold	7.3	7.6	8.0	V
Input Characteristic						
Current in 'PWM' pin	I_{PWM_L}	$V_{\_PWM}$ = 0.4 V	-80	115	-150	µA
Current in 'PWM' pin	I_{PWM_H}	$V_{\_PWM}$ = 4.5 V	120	180	250	
Shut down window	V_{IN_SHUT}	$t_{\_SHUT}$ > 350 ns	1.7		3.1	V
Shut down hold-off time	$t_{\_SHUT}$	1.7 V ≤ V_{PWM} ≤ 3.1 V	100	200	320	ns
PWM pin open	V_{PWM_O}		1.8	2.0	2.2	V
PWM Low level threshold (falling)	V_{PWM_L}				1.4	
PWM High level threshold (rising)	V_{PWM_H}		3.7			
Pulse Width High Side	$t_{\_p}$	= Pulse with on PWM pin	40			ns

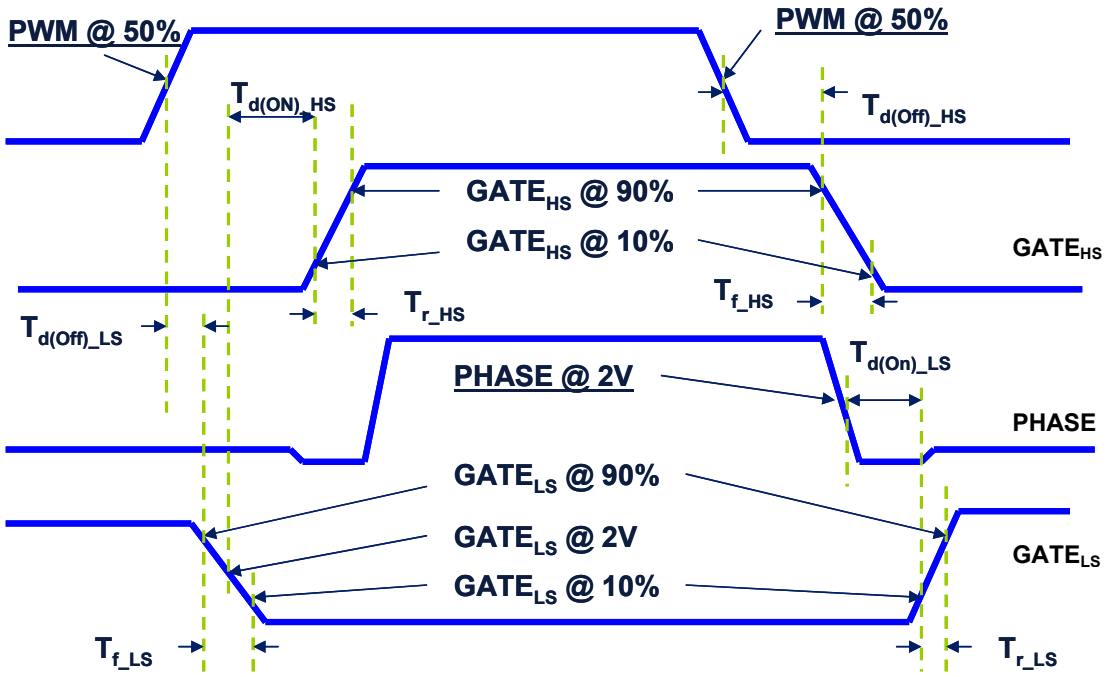
At **Tj = 25 °C**, unless otherwise specified

Dynamic Characteristic						
Turn-on propagation Delay High Side*	$t_{d(ON)\_HS}$	$P_{PVCC} = V_{VCC}$= 12 V C_{ISS} = 3000 pF		18	35	ns
Turn-off propagation delay High Side	$t_{d(OFF)\_HS}$			18	25	
Rise time High Side	t_{r_HS}			14	28	
Fall time High Side	t_{f_HS}			14	22	
Turn-on propagation Delay Low Side	$t_{d(ON)\_LS}$			17	23	
Turn-off propagation delay Low Side	$t_{d(OFF)\_LS}$			14	20	
Rise time Low Side	t_{r_LS}			22	29	
Fall time Low Side	t_{f_LS}			14	22	

At **Tj = 125 °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		22		ns
Turn-off propagation delay High Side	$t_{d(OFF)\_HS}$			22		
Rise time High Side	t_{r_HS}			16		
Fall time High Side	t_{f_HS}			16		
Turn-on propagation Delay Low Side	$t_{d(ON)\_LS}$			20		
Turn-off propagation delay Low Side	$t_{d(OFF)\_LS}$			18		
Rise time Low Side	t_{r_LS}			23		
Fall time Low Side	t_{f_LS}			16		

Measurement Timing diagram



Operating Conditions

At Tj = 25 °C, unless otherwise specified

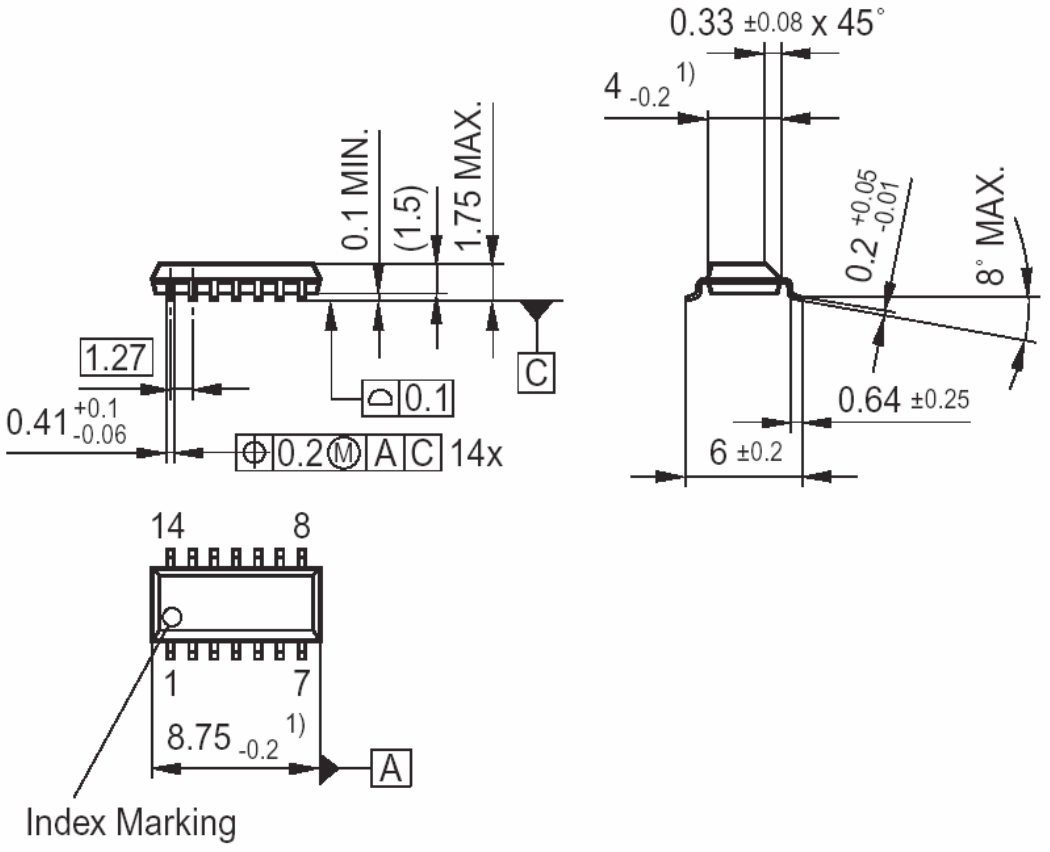
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Voltage supplied to 'VCC' pin	V_{VCC}		10.8		13.2	V
Voltage supplied to 'PVCC' pin	V_{PVCC}		5		13.2	V
Input signal transition frequency	f		0.1		2	MHz
Power dissipation	P_{TOT}	T_A = 25 °C, T_J = 125 °C		0.9		W
Junction temperature	T_J		-25		150	°C

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 Resistance	HS; Source	P_{PVCC} = V_{VCC}= 12 V $I_{\_HS\_SRC}$ = 2 A		1[1]		Ω
	HS; Sink	V_{VCC}= 12 V , P_{PVCC} = 5V		1	1.3	Ω
	HS; Sink	P_{PVCC} = V_{VCC}= 12 V		0.9	1.2	Ω
	LS; Source	P_{PVCC} = V_{VCC}= 12 V $I_{\_HS\_SRC}$ = 2 A		1.4[2]		Ω
	LS; Sink	V_{VCC}= 12 V , P_{PVCC} = 5V		1	1.3	Ω
	LS; Sink	P_{PVCC} = V_{VCC}= 12 V		1	1.25	Ω
Peak output-current	HS; Source	P_{PVCC} = V_{VCC}= 12 V	4			A
	HS; Sink	$t_{\_P\_HS}$ / Pulse < 20 ns	4			
	LS; Source	$t_{\_P\_LS}$ / Pulse < 40 ns	4			
	LS; Sink	$D_{\_HS}$ < 2%, $D_{\_LS}$ < 4%	4			

[1] Incremental resistance V_{BOOT}-V_{HS}=4.3V @ I_{SOURCE}=2A
[2] Incremental resistance V_{VCC} –V_{LS}=4.4V @ I_{SOURCE}=2A

Package Drawing P-DSO-14-3



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

Layout Footprints

e	A	L	B
1,27 mm	5,69 mm	1,31 mm	0,65 mm

Published by
Infineon Technologies AG,
Bereichs Kommunikation
St.-Martin-Strasse 53,
D-81541 München

Attention please!
The information herein is given to describe certain components and shall not be considered as warranted characteristics.

Terms of delivery and rights to technical change reserved.

We hereby disclaim any and all warranties, including but not limited to warranties of non-infringement, regarding circuits, descriptions and charts stated herein.

Infineon Technologies is an approved CECC manufacturer.

Information
For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office in Germany or our Infineon Technologies Representatives worldwide (see address list).

Warnings
Due to technical requirements components may contain dangerous substances.
For information on the types in question please contact your nearest Infineon Technologies Office.

Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.