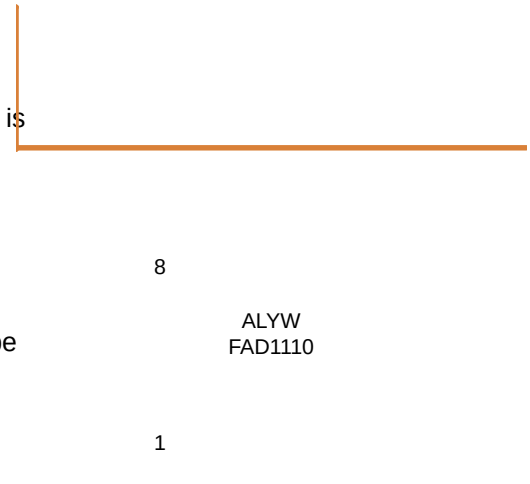
Ignition Gate Drive IC

FAD1110-F085



Description

The FAD1110ïF085 is designed to directly drive an ignition IGBT and control the current and spark event of the coil. The coil current is controlledvia the input pin. When the differential input is driven high, the output of the FAD1110ïF085 is enabled to turn on the IGBT and start charging the coil.

An input spike filtersuppresses differentialinput signals of less then 13 s in duration. A Max Dwell timer is included in the FAD1110ïF085which will turn off the IGBT if the input stays active for longer than the programmed time. This time interval can be modified through an external capacitor. When the Max Dwell timer is exceeded, the FAD1110ïF085 will enter a Hard Shutïdown mode (HSD) and turn off the IGBT immediately. The FAD1110ïF085 will also limit the collector current of the IGBT to $I_{C(lim)}$ during charging. This again is done through the sense resistor in the emitter leg of the Ignition IGBT developing a signal input to the V_{SENSE} pin of the FAD1110ïF085.

Features

- Differential Input for Ground Shift Disturbances Suppression
- Signal Line Input Buffer
- Input Spike Filter
- Operation from Ignition or Battery Line
- Ground Shift Tolerance: 2 V to 3 V
- Programmable Maximum Dwell Time
- Control IGBT Current Limiting through V_{SENSE} Pin
- Hard Shutdown Following Max Dwell Time Out
- This is a Pbïïree Device

Applications

The FAD1110ïF085 is anadvanced Ignition IGBT control IC available in a SO8 package or die sales. This full featured Smart Ignition IGBT Driver is particularly advantageous in “switch on coil” applications where size and system performance of the ignition driver are important.

ORDERING INFORMATION

Part Number	Operating Temperature Range	Package	Shipping †
FAD1110 ïF085	ï40°C to 150°C	8 ïSOIC	2500 units / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

Recommended External Components

TYPICAL EXTERNAL COMPONENTS

Component	Description	Vendor	Parameter	Typ.	Unit
R_{BAT}	Limits transient currents during load dump		R	200 to 300	
C_{BAT}	Battery or Ignition voltage filtering		C	0.47	F
C_{BAT1}	Battery noise transients		C	10	nF
C_{INC}					

Block Diagram

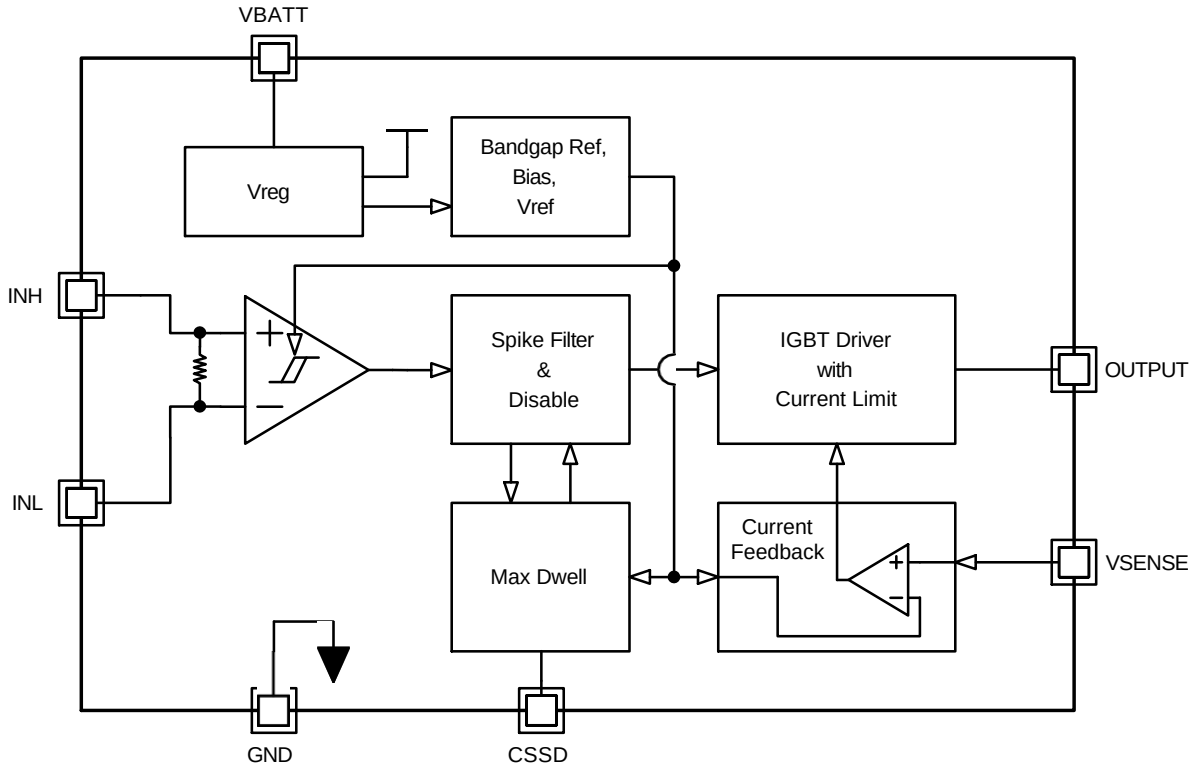


Figure 2. Block Diagram

Package Outline

The FAD1110ïF085 is assembled in an 8 lead SOIC Package.

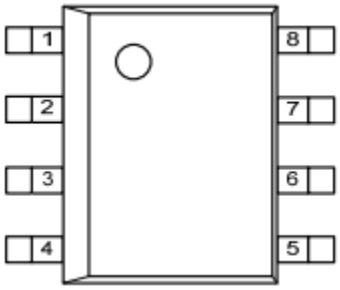


Figure 3. Pin Assignment (Top View)

PIN DESCRIPTION

Name	Type	Description
Pin1	GND	Ground Reference of the Control IC
Pin2	INL	Input ground signal

RECOMMENDED OPERATING CONDITIONS (Reference Load Characteristics) (Note 1)

Symbol	Characteristic	Min.	Typ.	Max.	Units
I_{Ctyp}	Collector (Coil) Operating Current		12		A
L_P	Coil Primary Inductance		1.5		mH
R_P	Coil Primary Resistance (25°C)		0.4		
R_{LOAD}	Load Resistance (for delay time measurements)		2		

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.
1. onsemi does not recommend exceeding them or designing to Absolute Maximum Ratings. (ï40°C to 150°C unless otherwise stated)

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
POWER SUPPLY CONDITIONS V_{BAT} = 6 to 28 V ; T_J = ï40°C to 150°C (unless otherwise specified)						
V_{BAT1}	Operating voltage	Coil switching function	4		28	V
V_{BAT2}	Operating voltage	All functions	6		28	V
I_{BAT}	Supply current	T_J = 150 °C, V_{BAT} = 28 V, Input = 5 V			4	mA
V_{CLAMP}	$V_{BATTERY}$ clamp	I_{BATT} = 10 mA	33		40	V
SENSE PIN CONDITIONS V_{BAT} = 6 to 28 V ; T_J = ï40°C to 150 °C (unless otherwise specified)						
V_{LIMIT}	Sense Voltage at current limit		200	220	240	mV
T_{SPIKE}	Input spike filter	Delay on rising and falling edge of Input		13		s
T_{D1}	Turn on delay time	(Time from Input = 4.0 V to V_{OUT} = 4.0 V)		17		s
T_{D2}	Turn off delay time	(Time from Input = 0.5 V to $V_{C\ ïGND}$ = 1.0 V)		17		s
INPUT CONTROL CONDITIONS V_{BAT} = 6 to 28 V; T_J = ï40°C to + 150°C (unless otherwise specified)						
V_{INLD}	Differential Input low voltage	INL = GND	1.3	1.7	2.1	V
V_{INHD}	Differential Input high voltage	INL = GND	1.7	2.2	2.7	V
V_{INHys}	Input voltage hysteresis		0.25	0.5	0.75	V
I_{IN}	Input current	V_{BAT} = 0 V, INL = GND		0.10xV_{INH}		mA
I_{IN}	Input current	6 V < V_{BAT} < 20 V, INL = GND		0.10xV_{INH}		mA
V_{CM}	Common mode voltage	Between V_{INH} and V_{INL} reference to GND	ï2		3	V
V_{INHGF}	Floating INH voltage	(6 V < V_S < 20 V_{INH} and INL floating) refer to GND @ T = 25°C		0.5		V
V_{INLGF}	Floating INL voltage	(6 V < V_S < 20 V_{INH} and INL floating) refer to GND @ T = 25°C		0.5		V
GATE OUTPUT VOLTAGE MAX V_{BAT} = 6 to 28 V; T_J = ï40°C to 150°C (unless otherwise specified)						
V_{GMAX}	Vgate max	16 K pulldown resistor	4.5	5.4	6	V
V_{GLOW}	Vgate low	(0 mA < I_{GATE} < 0.4 mA @ T = 25°C)	0.0		0.4	V
DIAGNOSTIC FUNCTIONS AND PROTECTION V_{BAT} = 6 to 28 V ; T_J = ï40°C to 150°C (unless otherwise specified)						
$CSSD_{MIN}$	Minimum dwell time capacitor			5		nF
TD_{MAX}	Maximum dwell time	(CSSD = 50 nF)	65	100	135	ms
I_{CSSD1}	CSSD Pin current for TDMAX		0.75	1.0	1.25	A

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL PERFORMANCE CHARACTERISTICS

Input and Spike Filter

When the differential input signal voltage between INH and INL pins reaches V_{INHD}, the IGBT will be switched on charging the coil. When this differential input voltage goes below V_{INLD}, the coil current through the IGBT will be turned off. Positive and negative spikes of less than t_{SPIKE} duration at the input line will be filtered out and will not turn on/off the IGBT.

Maximum Dwell Time and Hard ïShutdown (HSD)

When

FAD1110 ïF085

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