

## TDE1707BFP

### INTELLIGENT POWER SWITCH

PRODUCT PREVIEW

- 0.5A OUTPUT CURRENT
- LOW SIDE OR HIGH SIDE SWITCH CON-FIGURATION
- 6V TO 48V SUPPLY VOLTAGE RANGE
- OVERLOAD AND SHORT CIRCUIT PROTEC-TIONS
- INTERNAL VOLTAGE CLAMPING
- SUPPLY AND OUTPUT REVERSAL PRO-TECTION
- THERMAL SHUTDOWN
- GND AND V<sub>S</sub> OPEN WIRE PROTECTION
- ADJUSTABLE DELAY AT SWITCH ON
- INDICATOR STATUS LED DRIVER
- +5V REGULATED AUX. VOLTAGE
- HIGH BURST IMMUNITY

#### DESCRIPTION

The TDE1707BFP is a 0.5A Integrated Power Switch with up to 48V Power supply capability.

Two output configurations are possible:

- Load to Gnd. (High Side Mode)
- Load to Vs (Low side Mode)

Especially dedicated to proximity detectors, its in-BLOCK DIAGRAM



ternal +5V supply can be used to supply external circuits (See also AN495/0692). A signal is internally generated to block the In signal, and prevent activation of the output switch, as long as an abnormal condition is detected. The power-on transition, as well as the chip overtemperature and the output overcurrent, concurr to the generation of such signal. A minimum delay of  $25\mu s$  (Typ. value) is added to the trailing edge of such signal to ensure that a stable normal situation is present when the signal disappears. The delay (of the disapperance of the block signal; no delay at its on set) can be further increased connecting a capacitor between pin3 and ground. It can drive resistive or inductive loads.



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This is preliminary information on a new product now in development or undergoing evaluation. Details are subject to change without notice.

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#### **PIN CONNECTION** (Top view)



#### **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
Vs	Supply Voltage	50	V
V <sub>Sr</sub>	Supply Reverse Voltage	50	V
lo	Output Current	internally limited	А
V <sub>reg</sub>	Regulated Voltage Pin	0 to 7	V
V <sub>delay</sub>	Delay Cap. Surce Pin	0 to 5	V
Vo	Output Diff. Voltage	55	V
Vi	Input Voltage	-10 to 50	V
T <sub>op</sub>	Operating Temperature Range	-25 to +85	°C
T <sub>stg</sub>	Storage Temperature	-55 to 150	°C
P <sub>tot</sub>	Power Dissipation	internally limited	W
Eı	Energy Induct. Load	150	mJ

#### THERMAL DATA

Symbol	Description		Value	Unit
R <sub>th</sub> j-amb	Thermal Resistance Junction-ambient	Max.	150	°C/W

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Symbol	Parameter	Test Condition	Min.	Тур.	Max.	Unit
Vs7	Supply Voltage		6		48	V
I <sub>sr</sub> 7	Supply Reverse Current	$V_{SR} = -48V$			1.5	mA
l <sub>q</sub> 7	Quiescent Current	$I_{reg} = I_{led} = 0; V_i < 2V;$ V <sub>S</sub> = 6 to 48V			1.5	mA
l <sub>o</sub> 8/2	Output Current	Output Current V <sub>s</sub> = 6V to 32V			500	mA
I <sub>o</sub> 8/2	Output Current	Vs = 32V to 48V			300	mA
V <sub>sat</sub> 8/2	Output Voltage Drop V8-2	$I_o = 500 \text{mA}$		1.1	1.6	V
V <sub>sat</sub> 8/2	Output Voltage Drop V8-2	lo = 300mA			1.5	V
I <sub>sc</sub> 8/2	Short Circuit Current		0.7		1.5	Α
V <sub>cl</sub> 8/2	Internal Voltage Clamp	$I_{CL} = 10 \text{mA}$	55		70	V
I <sub>olk</sub> 8/2	Output Leakage	(Pin 2) $V_i < 2V; V_o = 0 \text{ to } V_s \text{ (Pin 8)}$		100	300 100	μΑ μΑ
V <sub>ith</sub> 5	Input Voltage Threshold		2		3	V
V <sub>ihis</sub> 5	Input Threshold Hysteresis			300		mV
I <sub>lk</sub> 5	Input Current	$V_i = 5V$		2	5	μΑ
V <sub>reg</sub> 6	Regulated Output Voltage	I <sub>reg</sub> < 5mA	4.5	5	5.5	V
I <sub>scr</sub> 6	Short Circuit Regulated		6	30	50	mA
I <sub>reg</sub> 6	Ouput Regulator Current	$V_s = 35V$ $V_s = 48V$			6 4	mA mA
l <sub>old</sub> 1	Current Surce Sink Led Driver	Output ON (±)	2	3	4	mA
V <sub>old</sub> 1	Voltage Drop Led Driver	$I_{os} = 2mA(\pm)$		1.2	1.6	V
Oldlk 1	Lead Driver (off) Leak.	$V_i < 2V; R_L < 1K\Omega$			10	μΑ
I <sub>dch</sub> 3	Del. Cap. Charge Current	$T_J = 25^{\circ}C$	2	4	6	μA
V <sub>dth</sub> 3	Delay Voltage Trigger	$T_J = 25^{\circ}C$		4		V

**ELECTRICAL CHARACTERISTICS** ( $V_S = 24V$ ;  $T_j = -25$  to +85°C, unless otherwise specified)

## **APPLICATION INFORMATION** (See Application Circuit)

The LED driver tells the output status.

It can source or sink current ( $I_{old typ} = 3mA$ ), according to the output configuration chosen.

The thresholds, represented by the output comparator in the Block Diagram, are set at about 1.5V - 2V.

For instance, in the High Side Load case of the

Application Circuit, when the voltage on pin 8 (the output) differs from V<sub>CC</sub> less than 1.5V, the output is sensed in "OFF" state and the LED driver is disabled. If instead pin 8 differs from V<sub>CC</sub> more than 3V (the

output comparator threshold value plus the drop voltage on the LED), then the output is sensed "ON" and the driver will force the current on the LED.

**DYNAMIC CHARACTERISTICS** ( $V_S = 24V$ ;  $R_L = 48\Omega$ ;  $T_J = 25^{\circ}C$ )

t <sub>on</sub>	Propagation Turn on Time	$V_i = 0$ to 5V		15		μs
t <sub>off</sub>	Propagation Turn off Time	$V_i = 5 \text{ to } 0V$		15		μs
t <sub>don</sub>	Delayed Turn on Time / nF Delay Capacitor		0.65	1	2	ms
t <sub>d min</sub>	Minimum Delayed t <sub>on</sub> Delay Capacitor = 0			25		μs

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#### **APPLICATION CIRCUIT**



# Figure 2: Saturation Voltage vs. Temperature (V<sub>S</sub> = 24V; $I_O$ = 500mA)





Figure 3: Quiescent Current) vs.Temperature  $(V_{\rm S} = 24V)$ 





DIM.	mm			inch			
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
А			1.75			0.069	
a1	0.1		0.25	0.004		0.010	
a2			1.65			0.065	
a3	0.65		0.85	0.026		0.033	
b	0.35		0.48	0.014		0.019	
b1	0.19		0.25	0.007		0.010	
С	0.25		0.5	0.010		0.020	
c1			45° (	(typ.)			
D (1)	4.8		5.0	0.189		0.197	
Е	5.8		6.2	0.228		0.244	
е		1.27			0.050		
e3		3.81			0.150		
F (1)	3.8		4.0	0.15		0.157	
L	0.4		1.27	0.016		0.050	
М			0.6			0.024	
S	8° (max.)						



(1) D and F do not include mold flash or protrusions. Mold flash or potrusions shall not exceed 0.15mm (.006inch).



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