

## Preliminary

# Automotive Dual High Side Driver

This device called "Flasher Lite" is a dual high side power switch dedicated for automotive applications. In comparison with mechanical relays, this device offers higher reliability as well as protection and diagnostic features.

The device consists of two independent 25mΩ R<sub>dson</sub> switches in a surface mount package. It can be directly interfaced with a microcontroller for control and diagnostic functions and includes a current recopy function. The device is fully protected against overcurrents, short-circuits and incorporates an overtemperature shutdown. It can be directly and continuously supplied by the battery and offers a very low quiescent current in standby mode.

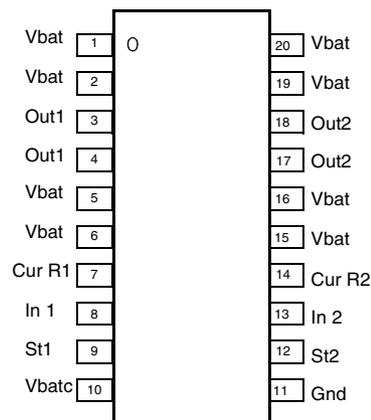
- Designed for Automotive Applications
- Junction Temperature Range from - 40°C to 150°C
- Operating Voltage Range from 8V to 40V
- Reverse Battery protected up to -14V with no external components
- Surface Mount Package, Thermally Enhanced
- 25mOhms max R<sub>dson</sub> per Channel at 25°C
- Independant Status Lines, one per channel
- Overtemperature Protection with Hysteresis
- Open Load Detection in On-State
- Short-Circuit Protection
- Loss of gnd, loss of Vbat protection
- Independant Current Recopy, one per channel
- Under Voltage Shutdown
- ESD Protection 2kV
- Current Limitation greater than 25A to Allow load Inrush Current
- Standby Current less than 1uA at V<sub>bat</sub>=14V and ambient temperature

## XC33487

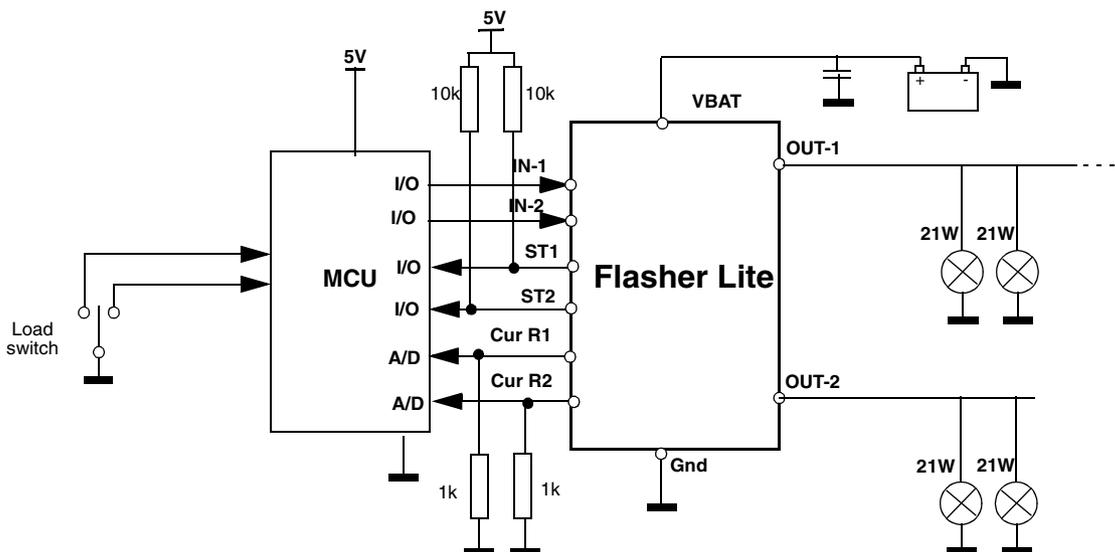


**DW SUFFIX**  
SO20WB Package  
CASE 751D-05

### PIN CONNECTIONS



### Simplified Application Schematic



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**MAXIMUM RATINGS**

Ratings	Symbol	Value	Unit
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**ELECTRICAL RATINGS**

Vbat Voltage with Respect to Gnd : Continuous/Pulse	Vbat	-14 to + 40	V
Out-1 & Out-2 Voltage with Respect of Gnd : Continuous/Pulse	Vout	-0.3 to 40	V
Out-1 to Vbat & Out-2 to Vbat voltage : Continuous/Pulse	Vout	40	V
IN-1, IN-2, ST-1, ST-2 Voltage : Continuous/Pulse	Vin	-0.3 to 7	V
Cur R1, Cur R2 Voltage : Continuous/Pulse	Vcr	-0.3 to 7	V
ESD all Pins	Vesd	+/-2000	V
Out-1, Out-2 DC Output Current	Ioutdc	8	Amp
Out-1, Out-2 Output Current : Pulse	Ioutp	40	Amp
IN-1, IN-2, ST-1, ST-2, Cur R1, Cur R2 Input Current	Iin	+/-5	mA

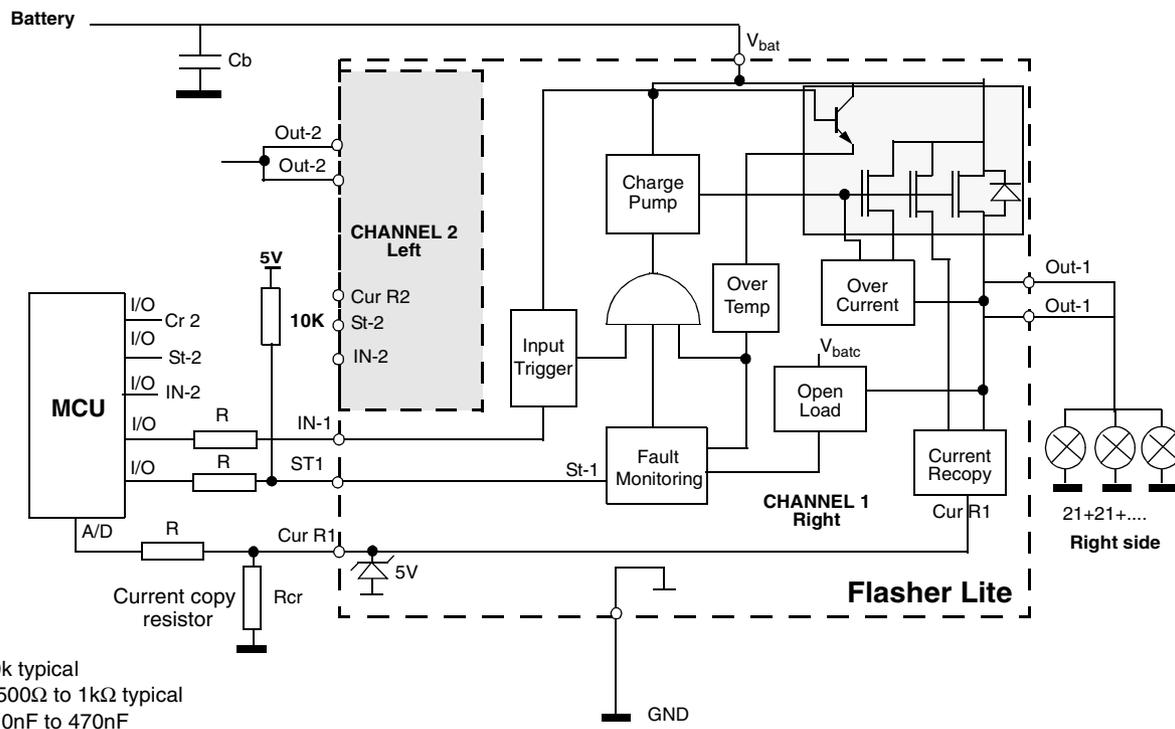
**THERMAL RATINGS**

Junction Temperature	Tj	- 40 to 150	°C
Storage Temperature Range	Tst	- 65 to +150	°C
Thermal Resistance Junction to Case	Rthjc	12	°C/W
Thermal Resistance Junction to Ambient (note 1)	Rthja	60	°C/W
Power Dissipation at Tcase 105°C (note 2)	Pd	3.75	W

**NOTES :**

1. Device mounted with minimum pcb dimensions.
2. Assuming a 150°C maximum junction temperature.

**Figure 1. Block Diagram and Application Schematic**



**ELECTRICAL CHARACTERISTICS** ( $V_{bat}$  and  $V_{batp}$  from 9 to 16 V and junction temperature  $T_j$  from  $-40^{\circ}$  to  $150^{\circ}$ C, unless otherwise noted)

Description	Symbol	Characteristics			Unit	Conditions
		min.	typ.	max.		
Nominal Operating Voltage	$V_{bat}$	9		16	V	
Functional Operating Voltage	$V_{bat}$	8		35	V	
Under Voltage Threshold	$V_{uv}$	6	7	8	V	
Vbat Standby Supply Current	$I_{stdby}$			1		$V_{bat} < 14V$ & $V_{in} = 0V$ , $T_j = 25^{\circ}C$
Vbat Standby Supply Current	$I_{stdby}$			25	$\mu A$	$V_{bat} < 14V$ & $V_{in} = 0V$ , $T_j = 125^{\circ}C$
Supply Current in On State	$I_{on}$		8	20	mA	IN-1 & IN-2 @ 3.5V, no fault, $V_{bat} < 14V$
Drain to Source on Resistance	$R_{dson}$		17	22	m $\Omega$	$I_{out} = 4A$ , $T_j = 25^{\circ}C$
Drain to Source on Resistance	$R_{dson}$		22	30	m $\Omega$	$I_{out} = 4A$ , $T_j = 125^{\circ}C$
High Current Limitation	$I_{lim}$		30		A	$V_{out} > 1V$
Short Circuit Limitation	$I_{lim}$		10			$V_{out} < 1V$
Hot Openload Threshold	$I_{ol}$		0.6		A	
Output Body Diode Voltage	$V_{bd}$		0.7		V	$I_{out} = -4A$ , $T_j = 25^{\circ}C$
Reverse Battery Drain to Source Voltage	$V_{rb}$			200	mV	$I_{out} = -4A$ , $V_{bat} = -14V$ , $T_j = 125^{\circ}C$
Vbat to Output Breakdown Voltage	$V_{dss}$	40			V	In-1 and In-2 @ 0V, $V_{out} = 0$ , $I_{out} = -0.25mA$
Vbat to Out : Leakage Current	$I_{out-leak}$			10	$\mu A$	$V_{in} = 0V$ , $V_{bat} = 40V$ , $V_{out} = 0V$
Vin-1, Vin-2 : Input Voltage Low Threshold	$V_{il}$			1.5	V	
Vin-1, Vin-2 : Input Voltage High Threshold	$V_{ih}$	3.5			V	
Vin-1, Vin-2 : Input Voltage Hysteresis	$V_{ih}$	0.2	0.7	0.9	V	
Vin-1, Vin-2 : Input Current	$I_{in}$		18	30	$\mu A$	$V_{in-1}$ , $V_{in-2} = 3.5V$
Status Output Voltage	$V_{st}$			0.5	V	$I_{st} = 1mA$ ; Output in Fault
Thermal Shutdown	$T_{shut}$	150			$^{\circ}C$	
Thermal Shutdown Hysteresis	$T_{hyst}$		10		$^{\circ}C$	
Current Recopy Ratio	$C_r$		1/1000			$V_{out} > V_{bat} - 1V$ , $I_{out}$ from 2A to 4A $T_j -40^{\circ}C$ to $125^{\circ}C$ , $V_{bat}$ 9 to 16V
Current Recopy Ratio Accuracy	$C_r-ac$	-10		10	%	$V_{out} > V_{bat} - 1V$ , $I_{out}$ from 2A to 4A $T_j -40^{\circ}C$ to $125^{\circ}C$ , $V_{bat}$ 9 to 16V
Current Recopy Clamp Voltage At 10mA	$V_{clst}$	5.5		7	V	$I_{out} = 9A$
Frequency Operation	$F_{op}$			150	Hz	
Maximum Output Positive Slew Rate	$T_r$	0.01	0.2	0.5	V/ $\mu s$	
Maximum Output Negative Slew Rate	$T_f$	0.15	0.5	1.5	V/ $\mu s$	
Turn On delay time	$T_{don}$		50	150	$\mu s$	load = 6 $\Omega$ , from $V_{in}/2$ to 10% $V_{out}$
Turn Off delay time	$T_{doff}$		70	150	$\mu s$	load = 6 $\Omega$ , from $V_{in}/2$ to 90% $V_{out}$

## FUNCTIONAL TRUTH TABLE

Conditions	IN1	IN2	OUT1	OUT2	St1	St2
Normal Operation	L	L	L	L	H	H
	H	L	H	L	H	H
	L	H	L	H	H	H
	H	H	H	H	H	H
Undervoltage	X	X	L	L	H	H
Overtemperature Channel 1 Overtemperature Channel 2 Overtemperature Channel 1/Channel 2	H	X	L	X	L	H
	X	H	X	L	H	L
	H	H	L	L	L	L
Open Load Channel 1 Open Load Channel 2	H	X	H	X	L	H
	X	H	X	H	H	L
Overcurrent Channel 1 Overcurrent Channel 2	H	X	X	X	H	H
	X	H	X	X	H	H

## PIN FUNCTION DESCRIPTION

Pin No.	Name/Function	Description
1, 2, 5, 6, 15, 16, 19, 20  10	$V_{bat}$ Supply Voltage  $V_{batc}$ Supply Voltage	These are the power supply pins of the device. These pins are directly connected with the lead frame of the package and are tied to the drain of the switching MOSFET. These pins can be directly connected to the battery voltage. In addition to their supply functions, these pins participate to the thermal behaviour of the device in conducting the heat from the switching MOSFET to the printed circuit board. $V_{batc}$ provide the supply voltage to the control die.
3, 4, 18, 17	OUT1 OUTPUT Channel 1 OUT2 OUTPUT Channel 2	Pins 3 and 4 are the output 1 terminals. Pins 17 and 18 are the output 2 terminals. They are directly connected to the source of the power MOSFET. The $R_{dson}$ is 25m $\Omega$ max per output at 25°C. Its value increases up to 40m $\Omega$ at 150°C junction temperature.
8, 13	IN 1 INPUT Channel 1 IN 2 INPUT Channel 2	These are the device input pins, which directly control their associated output. The thresholds are CMOS compatible. When the input is in low state, the associated output MOSFET is off. When input is high, the MOSFET is turned on and the load is activated. When both inputs are low, the device is in standby mode and its supply current is less than 10uA for $V_{bat}$ up to 14V.
7, 14	Cur R1 Current Recopy for Channel 1 Cur R2 Current Recopy for Channel 2	These pins corresponds to a current recopy for each outputs. Their high accuracy permit to allow a precise monitoring of the outputs loads as well as to detect a failed lamp among several lamps. An external resistor must be connected to these pins which can be tied to a microcontroller A/D for analog measurements
9, 12	ST-1 Status for Channel 1 ST-2 Status for Channel 2	These pins are the channel 1 and 2 status. Their internal structure is an open drain with an internal clamp at 6V. An external pull up connected to the 5V is needed. When the device is in normal condition the status is high. If open load or overtemperature occurs on one channel, the associated output status will be pulled low.

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