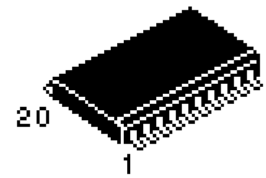
Order Number: XC33487/D
Rev. 1.3, 06/2001

Preliminary

Automotive Dual High Side Driver

XC33487



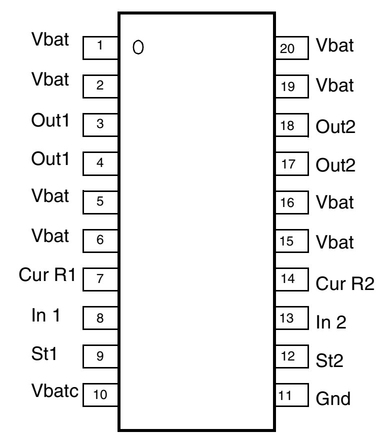
DW SUFFIX
SO20WB Package
CASE 751D-05

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.

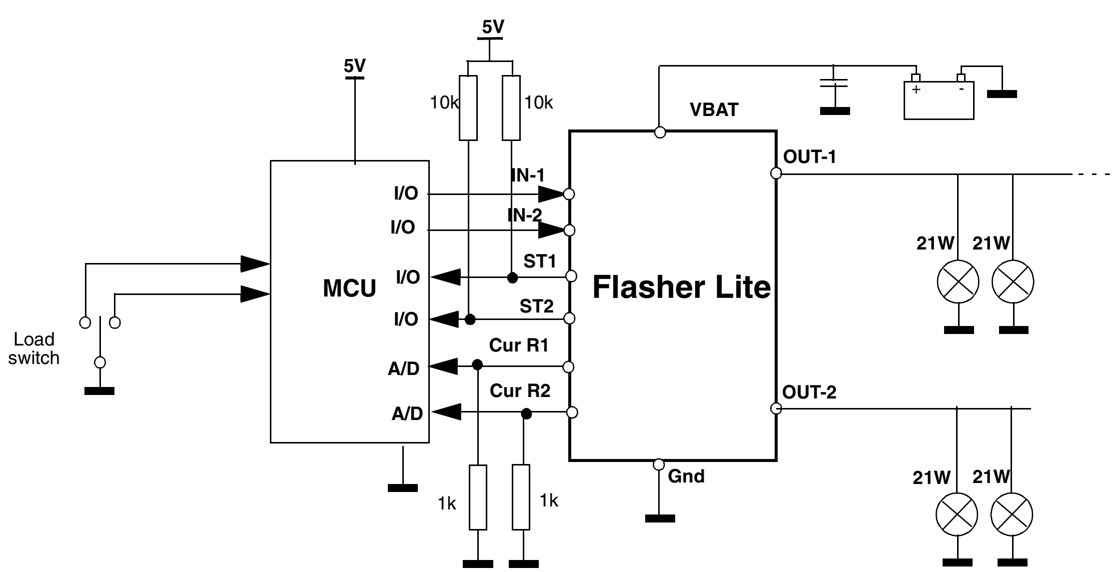
The device consists of two independent 25mΩ Rdson switches in a surface mount package. It can be directly interfaced with a microcontroller for control and diagnostic functions and includes a current recopy function. The device is fully protected against overcurrents, short-circuits and incorporates 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 Rdson 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_{bat} =14V and ambiant temperature

PIN CONNECTIONS



Simplified Application Schematic



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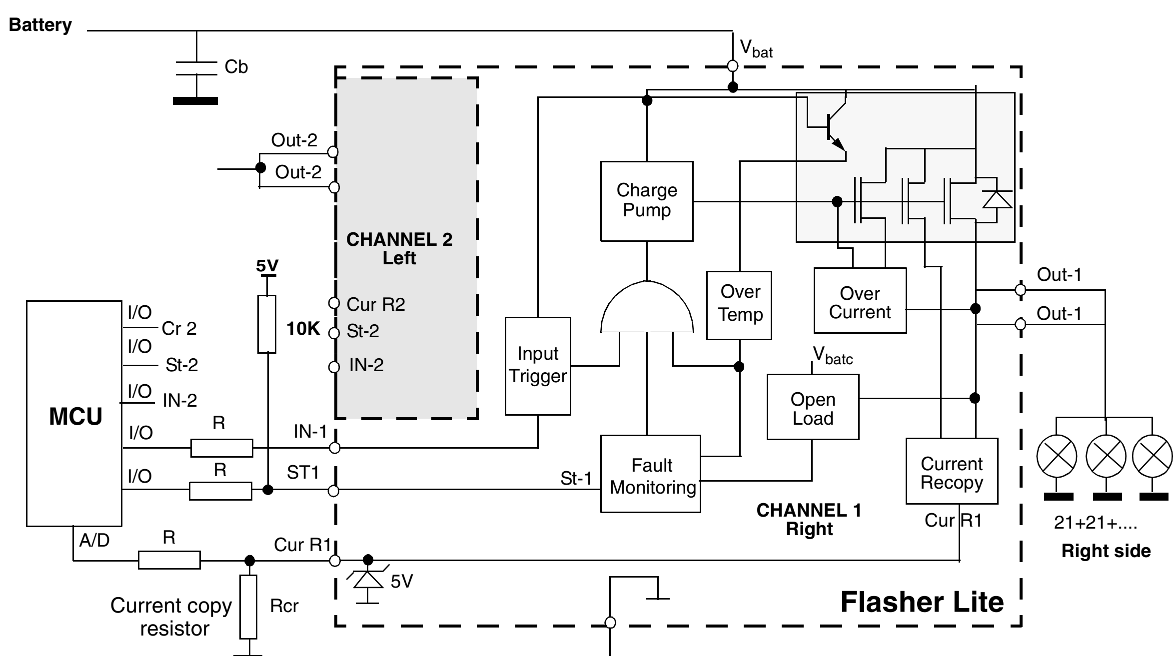
MOTOROLA digital dna™

MAXIMUM RATINGS

Ratings	Symbol	Value	Unit
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



R : 10k typical
Rcr : 500Ω to 1kΩ typical
Cb : 10nF to 470nF

ELECTRICAL CHARACTERISTICS (Vbatc and Vbatp from 9 to 16 V and junction temperature Tj from -40° to 150°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°C
Vbat Standby Supply Current	I_{stdby}			25	µA	V_{bat} <14V & V_{in} = 0V, T_j = 125°C
Supply Current in On State	I_{on}		8	20	mA	IN-1 & IN-2 @3.5V, no fault, Vbat<14V
Drain to Source on Resistance	R_{dson}		17	22	mΩ	Iout =4A,T_j = 25°C
Drain to Source on Resistance	R_{dson}		22	30	mΩ	Iout = 4A, T_j = 125°C
High Current Limitation	I_{lim}		30		A	Vout>1V
Short Circuit Limitation	I_{lim}		10			Vout<1V
Hot Openload Threshold	I_{ol}		0.6		A	
Output Body Diode Voltage	V_{bd}		0.7		V	Iout = -4A, Tj = 25°C
Reverse Battery Drain to Source Voltage	V_{rb}			200	mV	Iout = -4A, Vbat = -14V, Tj = 125°C
Vbat to Output Breakdown Voltage	V_{dss}	40			V	In-1 and In-2 @ 0V, Vout = 0, Iout -0.25mA
Vbat to Out : Leakage Current	$I_{out\text{-}leak}$			10	µA	Vin =0V, Vbat =40V, Vout=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	µA	Vin-1, Vin-2 = 3.5V
Status Output Voltage	Vst			0.5	V	Ist = 1mA; Output in Fault
Thermal Shutdown	T_{shut}	150			°C	
Thermal Shutdown Hysteresis	T_{hyst}		10		°C	
Current Recopy Ratio	Cr		1/1000			Vout>Vbat -1V, Iout from 2A to 4A Tj -40°C to 125°C, Vbat 9 to 16V
Current Recopy Ratio Accuracy	Cr-ac	-10		10	%	Vout >Vbat -1V, Iout from 2A to 4A Tj -40°C to 125°C, Vbat 9 to 16V
Current Recopy Clamp Voltage At 10mA	Vclst	5.5		7	V	Iout=9A
Frequency Operation	Fop			150	Hz	
Maximum Output Positive Slew Rate	Tr	0.01	0.2	0.5	V/µs	
Maximum Output Negative Slew Rate	Tf	0.15	0.5	1.5	V/µs	
Turn On delay time	Tdon		50	150	µs	load = 6Ω, from Vin/2 to10% Vout
Turn Off delay time	Tdoff		70	150	µs	load = 6 Ω, from Vin/2 to 90% Vout

FUNCTIONAL TRUTH TABLE

Conditions	IN1	IN2	OUT1	OUT2	St1	St2
Normal Operation	L H L H	L L H H	L H L H	L L H 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 H	X H H	L X L	X L L	L H L	H L L
Open Load Channel 1 Open Load Channel 2	H X	X H	H X	X H	L H	H L
Overcurrent Channel 1 Overcurrent Channel 2	H X	X H	X X	X X	H H	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 Voltag	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 OUT 2 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 Rdson is 25mΩ max per output at 25°C. Its value increases up to 40mΩ 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.

How to reach us:
USA / EUROPE / Locations Not Listed: Motorola Literature Distribution; P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447

Technical Information Center: 1-800-521-6274

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JAPAN: Motorola Japan Ltd.; SPS, Technical Information Center, 3-20-1, Minami-Azabu, Minato-ku, Tokyo 106-8573 Japan. 81-3-344-3569

ASIA / PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Centre, 2, Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong. 852-26668334