

HVIC Half-Bridge Driver

Description:

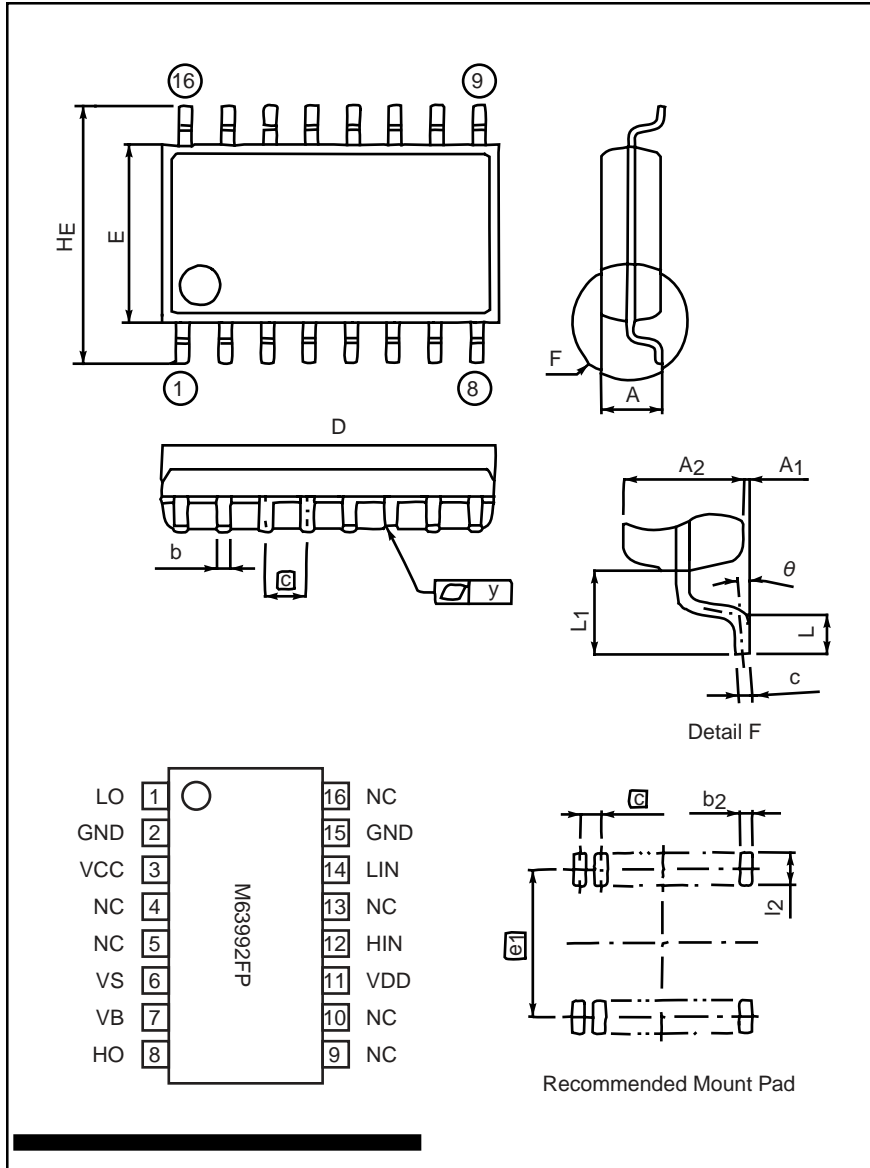
M63991FP is a high voltage, Power MOSFET/IGBT module driver for half-bridge applications.

Features:

- 600V Floating Supply Voltage
- ±500mA Output Current
- Half-Bridge Driver
- SOP-16 Package

Application:

- Appliances
- Air Conditioners
- AC Servo Motors
- General Purpose Power Supplies



Outline Drawing and Pin Diagram

Dimensions	Inches	Millimeters
A	0.08 Max.	2.1 Max.
A ₁	0.004±0.004/0	0.1±0.1/0
A ₂	0.07	1.8
b	0.02+0.004/-0.002	0.4+0.1/-0.05
c	0.01+0.002/-0.008	0.2+0.05/-0.02
[C]	0.05	1.27
D	0.4±0.004	10.1±0.1
E	0.21±0.004	5.3±0.1

Dimensions	Inches	Millimeters
H _E	0.31±0.01	7.8±0.3
L	0.02±0.01	0.6±0.2
L ₁	0.05	1.25
[e1]	0.31	7.62
y	0.004 Max.	0.1 Max.
θ	0° – 8°	0° – 8°
b ₂	0.03	0.76
l ₂	0.05 Min.	1.27 Min.



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Absolute Maximum Ratings, $T_a = 25^\circ\text{C}$ unless otherwise specified

Ratings	Symbol	Test Conditions	M63991FP	Units
High Side Floating Supply Voltage	V_B		-0.5 ~ 624	Volts
High Side Floating Supply Offset Voltage	V_S		$V_B - 24 + 0.5$	Volts
High Side Output Voltage	V_{HO}		$V_S - 0.5 \sim V_B + 0.5$	Volts
Low Side Fixed Supply Voltage	V_{CC}		-0.5 ~ 24	Volts
Low Side Output Voltage	V_{LO}		-0.5 ~ $V_{CC} + 0.5$	Volts
Logic Supply Voltage	V_{DD}		-0.5 ~ 7	Volts
Logic Input Voltage	V_{IN}	H_{IN}, L_{IN}	-0.5 ~ $V_{DD} + 0.5$	Volts
Allowable Offset Supply Voltage Transient	dV_S/dt		± 50	V/ns
Package Power Dissipation	P_t	$T_a = 25^\circ\text{C}$, On Board	1.1	W
Linear Derating Factor	K_θ	$T_a > 25^\circ\text{C}$, On Board	-11	mW/ $^\circ\text{C}$
Junction Temperature	T_j		-20 ~ 125	$^\circ\text{C}$
Operation Temperature	T_{opr}		-20 ~ 75	$^\circ\text{C}$
Storage Temperature	T_{stg}		-40 ~ 125	$^\circ\text{C}$

Recommended Operating Conditions

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
High Side Floating Supply Voltage	V_B		$V_S + 13.5$	—	$V_S + 20$	Volts
High Side Floating Supply Offset Voltage	V_S		-5	—	500	Volts
Low Side Fixed Supply Voltage	V_{CC}		13.5	—	20	Volts
Logic Supply Voltage	V_{DD}		4.5	—	5.5	Volts
Logic Input Voltage	V_{IN}	H_{IN}, L_{IN}	0	—	V_{DD}	Volts

Function Table

H_{IN}	L_{IN}	$V_{BS} U_V$	$V_{CC} U_V$	HO	LO	Behavioral State
L	L	H	H	L	L	LO = OFF, HO = OFF
L	H	H	H	L	H	LO = ON, HO = OFF
H	L	H	H	H	L	LO = OFF, HO = ON
H	H	H	H	L	L	LO = OFF, HO = OFF, $L_{IN} = H_{IN} = H$ Simultaneously
X	L	L	H	L	L	LO = OFF, HO = OFF, $V_{BS} U_V$ Tripped
X	H	L	H	L	H	LO = ON, HO = OFF, $V_{BS} U_V$ Tripped
L	X	H	L	L*	L	LO = OFF, HO = OFF, $V_{CC} U_V$ Tripped
H	X	H	L	H*	L	LO = OFF, HO = ON, $V_{CC} U_V$ Tripped

* Note: "L" state of $V_{BS} U_V$ and $V_{CC} U_V$ means that supply is below trip level.
 If V_{CC} becomes less than U_V trip, HO state will not change.
 If V_{CC} becomes less than U_V , H_{IN} state will not transfer to HO.

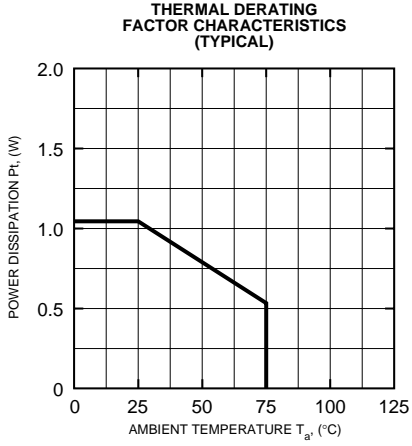
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Electrical Characteristics, $T_a = 25^\circ\text{C}$, $V_{CC} = V_{BS} = 15\text{V}$, $V_{DD} = 5\text{V}$ unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.*	Max.	Units
Floating Supply Leakage Current	I_{FS}	$V_B = V_S = 600\text{V}$	—	—	10	μA
V_{BS} Standby Current	I_{BS}		0.2	0.5	1.0	mA
V_{CC} Standby Current	I_{CC}		0.2	0.5	1.0	mA
V_{DD} Standby Current	I_{DD}		—	—	100	μA
High Level Output Voltage	V_{OH}	$I_O = 0\text{A}$, LO, HO	13.8	14.4	—	Volts
Low Level Output Voltage	V_{OL}	$I_O = 0\text{A}$, LO, HO	—	—	0.1	Volts
High Level Input Threshold Voltage	V_{IH}	H_{IN} , L_{IN}	2.1	3.0	4.0	Volts
Low Level Input Threshold Voltage	V_{IL}	H_{IN} , L_{IN}	0.6	1.5	1.9	Volts
High Level Input Bias Current	I_{IH}	$V_{IN} = 5\text{V}$	—	25	75	μA
Low Level Input Bias Current	I_{IL}	$V_{IN} = 0\text{V}$	—	—	1.0	μA
V_{BS} Supply UV Trip Voltage	V_{BSUVT}		9.5	10.5	11.5	Volts
V_{BS} Supply UV Reset Voltage	V_{BSUVR}		10.0	11.0	12.0	Volts
V_{BS} Supply Filter Time	t_{VBSUV}		—	7.5	—	μs
V_{CC} Supply UV Trip Voltage	V_{CCUVT}		9.5	10.5	11.5	Volts
V_{CC} Supply UVReset Voltage	V_{CCUVR}		10.0	11.0	12.0	Volts
V_{CC} Supply Filter Time	t_{VCCUV}		—	7.5	—	μs
Output High Level Short Circuit Pulsed Current	I_{OH}	$V_O = 0\text{V}$, $V_{IN} = 5\text{V}$, $PW < 10 \mu\text{s}$	—	-0.5	—	A
Output Low Level Short Circuit Pulsed Current	I_{OL}	$V_O = 15\text{V}$, $V_{IN} = 0\text{V}$, $PW < 10 \mu\text{s}$	—	0.5	—	A
Output High Level On Resistance	R_{OH}	$I_O = -200\text{mA}$, $R_{OH} = (V_{OH} - V_O) / I_O$	—	40	—	Ω
Output Low Level On Resistance	R_{OL}	$I_O = 200\text{mA}$, $R_{OL} = V_O / I_O$	—	20	—	Ω
High Side Turn-On Propagation Delay	$t_{dLH}(\text{HO})$		250	300	350	ns
High Side Turn-Off Propagation Delay	$t_{dHL}(\text{HO})$	$CL = 1000\text{pF}$ between HO to V_S	230	280	330	ns
High Side Turn-On Rise Time	$t_r(\text{HO})$		—	80	—	ns
High Side Turn-Off Fall Time	$t_f(\text{HO})$		—	60	—	ns
Low Side Turn-On Propagation Delay	$t_{dLH}(\text{LO})$		250	300	350	ns
Low Side Turn-Off Propagation Delay	$t_{dHL}(\text{LO})$	$CL = 1000\text{pF}$ between LO to GND	230	280	330	ns
Low Side Turn-On Rise Time	$t_r(\text{LO})$		—	80	—	ns
Low Side Turn-Off Fall Time	$t_f(\text{LO})$		—	60	—	ns
Delay Matching, High Side and Low Side Turn-On	t_{dMon}	$ t_{dLH}(\text{HO}) - t_{dLH}(\text{LO}) $	—	—	30	ns
Delay Matching, High Side and Low Side Turn-Off	t_{dMoff}	$ t_{dHL}(\text{HO}) - t_{dHL}(\text{LO}) $	—	—	30	ns

* The typical values are those measured under ambient temperature (T_a) of 25°C .
 There is no guarantee that these values are obtained under any conditions.

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BLOCK DIAGRAM

