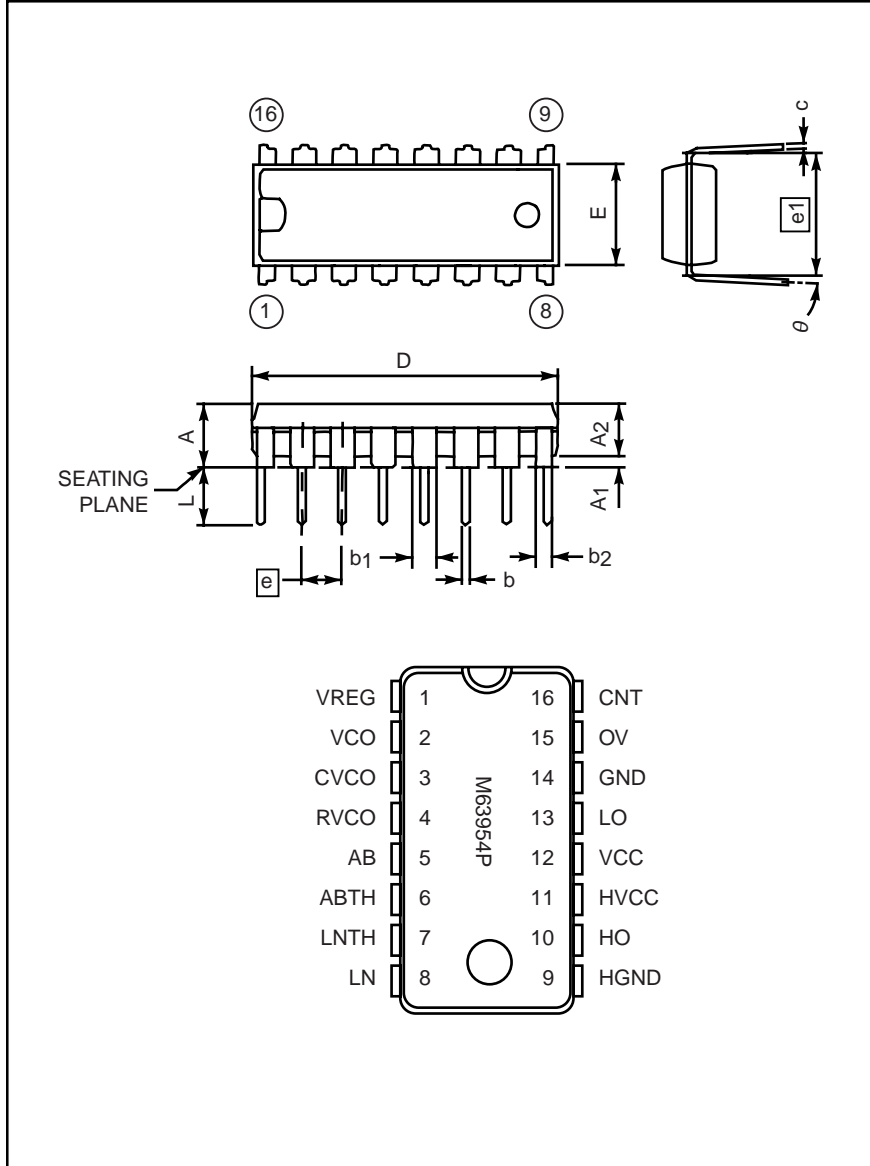


HVIC Half-Bridge Driver



Description:

M63954P is a high voltage integrated circuit designed for electronic ballast, Power MOSFET and IGBT module driver for half-bridge applications.

Features:

- 600V Floating Supply Voltage
- ±500mA Output Current
- Half-Bridge Driver
- Built-In Oscillator
- DIP-16 Package
- Built-In Regulator

Application:

The M63954P is designed for use in electronic ballasts for fluorescent lamps.

Outline Drawing and Pin Diagram

Dimensions	Inches	Millimeters
A	0.18 Max.	4.5 Max.
A ₁	0.02 Min.	0.51 Min.
A ₂	0.13	3.3
b	0.02±0.004	0.5±0.1
b ₁	0.06+0.01/-0.004	1.5+0.3/-0.1
b ₂	0.04+0.01/-0.004	1.0+0.3/-0.1
c	0.01	0.27+0.07/-0.05

Dimensions	Inches	Millimeters
D	0.75±0.01	19.0±0.2
E	0.25±0.01	6.3±0.15
e	0.10	2.54
e ₁	0.31	7.62
L	0.12 Min.	3.0 Min.
θ	0° – 15°	0° – 15°



Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (724) 925-7272

M63954P
HVIC Half-Bridge Driver

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

Ratings	Symbol	Test Conditions	M63954P	Units
High Side Floating Supply Offset Voltage	H_{GND}		600	Volts
High Side Floating Supply Voltage	H_{VCC}	$H_{GND} = GND$	-0.5 ~ 20	Volts
Low Side Fixed Supply Voltage	V_{CC}		-0.5 ~ 20	Volts
OV Input Voltage	V_{OV}		-0.5 ~ $V_{CC}+0.5$	Volts
AB Input Voltage	V_{AB}		-0.5 ~ $V_{CC}+1.0$	Volts
AB Input Current	I_{AB}		2	mA
ABTH Input Voltage	V_{ABTH}		-0.5 ~ $V_{CC}+0.5$	Volts
LN Input Voltage	V_{LN}		-0.5 ~ $V_{CC}+1.0$	Volts
LN Input Current	I_{LN}		2	mA
LNTH Input Voltage	V_{LNTH}		-0.5 ~ $V_{CC}+0.5$	Volts
V_{CO} Input Voltage	V_{VCO}		-0.5 ~ $V_{CC}+0.5$	Volts
High Side Output Current	I_{HO}		± 500	mA
Low Side Output Current	I_{LO}		± 500	mA
Package Power Dissipation	P_t	$T_a = 25^\circ\text{C}$, On Board	1.67	W
Linear Derating Factor	$K\theta$	$T_a > 25^\circ\text{C}$, On Board	13.3	mW/ $^\circ\text{C}$
Junction Temperature	T_j		150	$^\circ\text{C}$
Operation Temperature	T_{opr}		-20 ~ 80	$^\circ\text{C}$
Storage Temperature	T_{stg}		-40 ~ 125	$^\circ\text{C}$

Output Frequency, $R_{VCO1} = 15\text{k}\Omega$, $R_{VCO2} = 39\text{k}\Omega$, $C_{VCO} = 100\text{pF}$

Oscillation Frequency	V_{CO} Input Voltage	Min.	Typ.	Max.	Units
50kHz	$0.33V_{REG}$	—	50	—	kHz
60kHz	$0.42V_{REG}$	—	60	—	kHz



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M63954P
HVIC Half-Bridge Driver

Electrical Characteristics, $H_{GND} = GND$, $H_{VCC} = V_{CC} = 15V$, $T_a = 25^\circ C$, unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
General						
High Side Floating Supply Voltage	H_{VCC}	$H_{VCC} - H_{GND}$	13	15	17	Volts
Low Side Fixed Supply Voltage	V_{CC}		13	15	17	Volts
Internal Supply Voltage	V_{REG}	$V_{CC} = 15V$, No Load	6.9	7.2	7.5	Volts
Standby Current	I_{CC1}	$V_{CC} = 15V$, $C_{NT} = 5V$, $OV = 5V$	—	0.75	1	mA
ON Suspension Oscillate Current	I_{CC2}	$V_{CC} = 15V$, $CNT = 0V$	—	2	4	mA
ON Oscillation Current (50kHz)	I_{CC3}	$V_{CC} = 15V$, $R_{VCO1} = 15k\Omega$, $V_{VCO} = 0.33 V_{REG}$	2	5	8	mA
ON Oscillation Current (115kHz)	I_{CC4}	$R_{VCO2} = 39k\Omega$ $C_{VCO} = 100pF$, $V_{VCO} = 0.42 V_{REG}$	2	8	12	mA
UV Voltage						
V_{CC} UV Reset Voltage	V_{UVr}		9.0	10.0	11.0	Volts
V_{CC} UV Trip Voltage	V_{UVt}		5.5	6.5	7.5	Volts
UV Response Delay Time	t_{UV}		14	—	100	μs
OV Voltage						
OV Protection V_{th}	V_{OV}		3.4	3.6	3.8	Volts
OV Response Delay Time	t_{OV}		30	—	150	μs
OV Input Leak Current	I_{OV}	$V_{OV} = 0V$	-0.5	-0.08	—	μA
V_{CO} Voltage						
V_{CO} Frequency Set Up Limit	f_{VCO}		—	—	250	kHz
Output Frequency Set Up Limit	f_O	LO, HO	—	—	125	kHz
V_{CO} Input Voltage Limit	V_{VCO}		1.5	—	$V_{REG} - 1.5$	Volts
V_{CO} Input Leak Current	I_{VCO}	$V_{VCO} = 0V$	-2	-0.66	—	μA
C_{VCO} Input Voltage	V_{CVCO}	$V_{REG} = 7.2V$	5.5	5.55	5.6	Volts
C_{VCO} Input Leak Current	I_{CVCO}	$V_{CVCO} = 0V$, $V_{VCO} > V_{CVCO}$	-2	-0.66	—	μA
R_{VCO} Leak Current	I_{RVCO}	$V_{CVCO} = 0V$, $V_{REG} = 7.2V$, $V_{RVCO} = 10V$	—	—	0.5	μA
R_{VCO} Saturation Voltage	V_{SRVCO}	$V_{CVCO} = 6V$, $V_{REG} = 7.2V$, $I_{RVCO} = 10mA$	—	—	500	mV

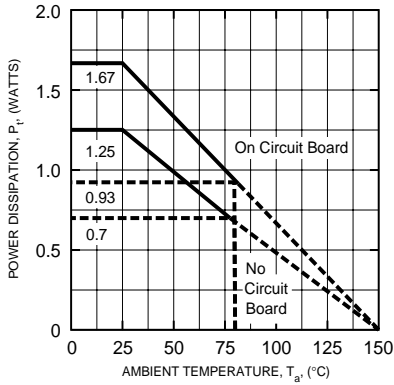
M63954P
HVIC Half-Bridge Driver

Electrical Characteristics, $H_{GND} = GND$, $H_{VCC} = V_{CC} = 15V$, $T_a = 25^\circ C$, unless otherwise specified

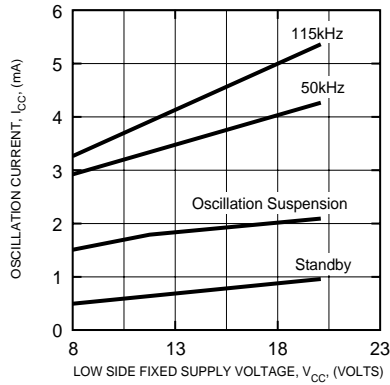
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Connection Detect						
LN Input Voltage Limit	V_{LN}		1	—	$V_{CC}-1.5$	Volts
LNTH Input Voltage Limit	V_{LNTH}		1	—	$V_{CC}-1.5$	Volts
LN Offset Voltage	V_{LNIO}		-50	—	50	mV
LN Input Leak Current	I_{LN}	$V_{LN} < V_{LNTH}$	-1.0	-0.22	—	μA
LNTH Input Leak Current	I_{LNTH}	$V_{LN} > V_{LNTH}$, $V_{CC} < V_{UVr}$	-1.0	-0.22	—	μA
LNTH Input Hysteresis Current	I_{LNTHh}	$V_{LN} > V_{LNTH}$, $V_{LNTH} = 5V$	20	40	80	μA
LN Response Delay Time	t_{LN}		14	—	100	μs
Abnormal Detect						
AB Input Voltage Limit	V_{AB}		0	—	$V_{REG}-1.5$	Volts
ABTH Input Voltage Limit	V_{ABTH}		0	—	$V_{REG}-1.5$	Volts
AB Offset Voltage	V_{ABIO}		-50	—	50	mV
AB Input Leak Current	I_{AB}	$V_{AB} < V_{ABTH}$	-0.5	-0.08	—	μA
ABTH Input Leak Current	I_{ABTH}	$V_{AB} > V_{ABTH}$	-0.5	-0.08	—	μA
AB Response Delay Time	t_{AB}		30	—	150	μs
External CNT						
CNT Input Threshold Voltage	V_{CNT}		3.4	3.6	3.8	Volts
CNT Input Hysteresis Voltage	V_{CNTTh}		0.8	1.0	1.2	Volts
CNT Input Leak Current	I_{CNT}	$V_{CNT} = 0V$	-0.5	-0.08	—	μA
CNT Response Delay Time	t_{CNT}		30	—	150	μs
Driver						
Floating Supply Leak Current	I_{RFC}	$V_{HGND} = 600V$	—	—	2.0	μA
Dead Time	t_{DEAD}	$C = 1000pF$	1.0	—	1.9	μs
HO Output Voltage	V_{HOH1}	$I_{HO} = 0mA$	14.0	14.4	—	Volts
	V_{HOH2}	$I_{HO} = -20mA$	10	13	—	Volts
	V_{HOH3}	$I_{HO} = -200mA$	1.0	5.5	—	Volts
	V_{HOL1}	$I_{HO} = 0mA$	—	5	100	mV
	V_{HOL2}	$I_{HO} = 20mA$	—	0.5	1.0	Volts
	V_{HOL3}	$I_{HO} = 200mA$	—	6	12	Volts
LO Output Voltage	V_{LOH1}	$I_{LO} = 0mA$	14.0	14.4	—	Volts
	V_{LOH2}	$I_{LO} = -20mA$	10	13	—	Volts
	V_{LOH3}	$I_{LO} = -200mA$	1.0	5.5	—	Volts
	V_{LOL1}	$I_{LO} = 0mA$	—	5	100	mV
	V_{LOL2}	$I_{LO} = 20mA$	—	0.5	1.0	Volts
	V_{LOL3}	$I_{LO} = 200mA$	—	6	12	Volts
Output Rise Time	t_r	Amplitude 10% \rightarrow 90%, $C = 1000pF$	—	50	120	ns
Output Fall Time	t_f	Amplitude 90% \rightarrow 10%, $C = 1000pF$	—	50	120	ns

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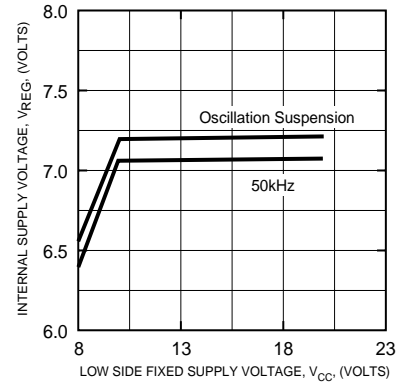
THERMAL DERATING FACTOR CHARACTERISTICS (TYPICAL)



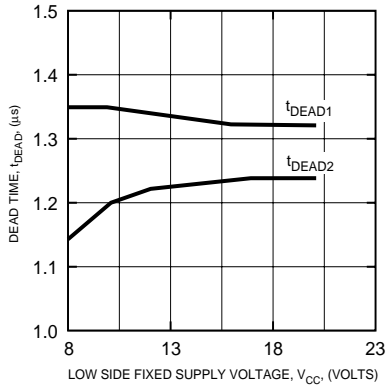
I_{CC} VS. V_{CC} CHARACTERISTIC



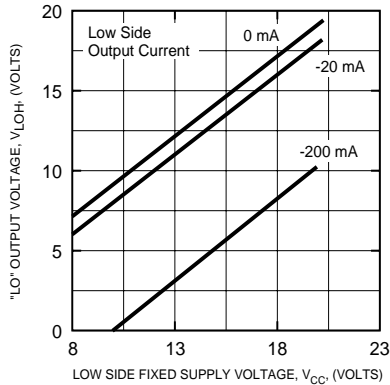
V_{REG} VS. V_{CC} CHARACTERISTIC



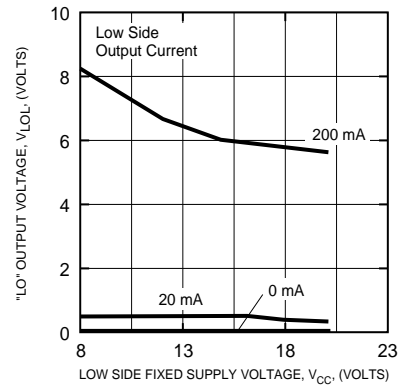
t_{DEAD} VS. V_{CC} CHARACTERISTIC



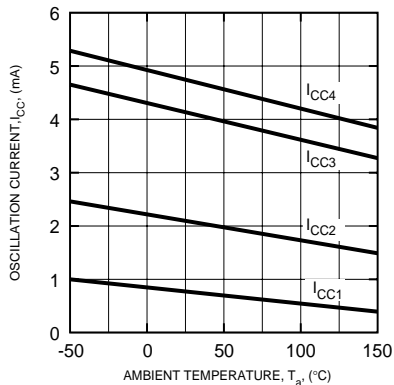
V_{LOH} VS. V_{CC} CHARACTERISTIC



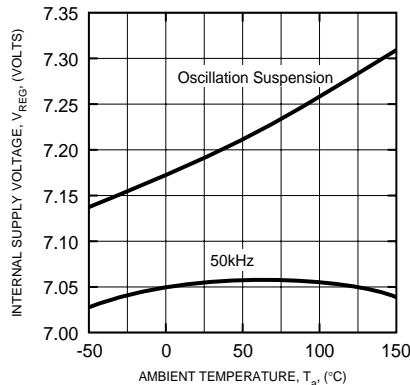
V_{LOL} VS. V_{CC} CHARACTERISTIC



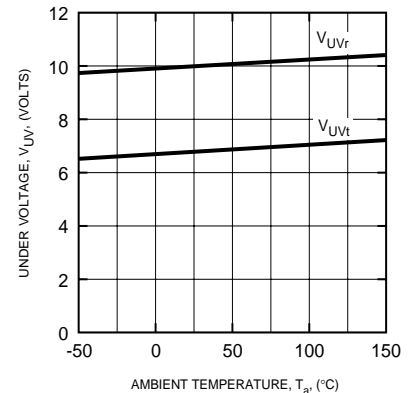
I_{CC} VS. T_a CHARACTERISTIC



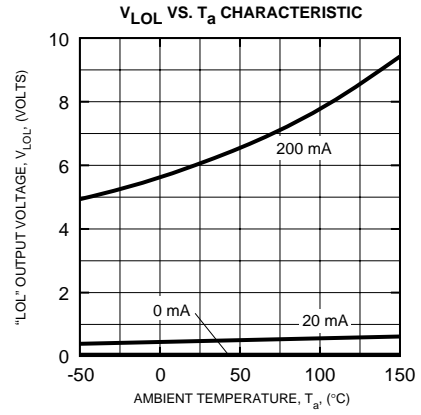
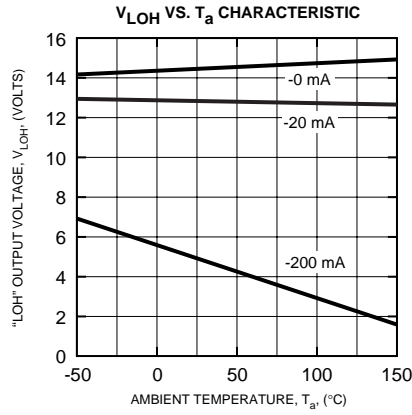
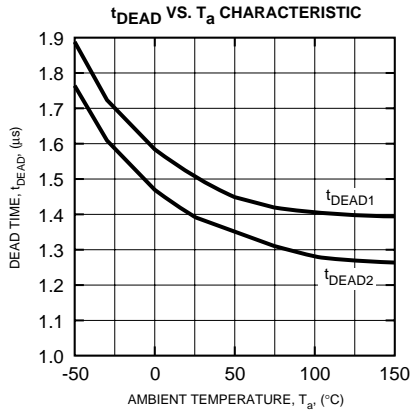
V_{REG} VS. T_a CHARACTERISTIC



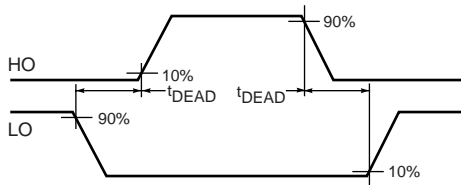
V_{UV} VS. T_a CHARACTERISTIC



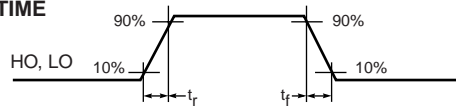
M63954P
HVIC Half-Bridge Driver



DEAD TIME



**OUTPUT RISE TIME
 FALL TIME**



BLOCK DIAGRAM

