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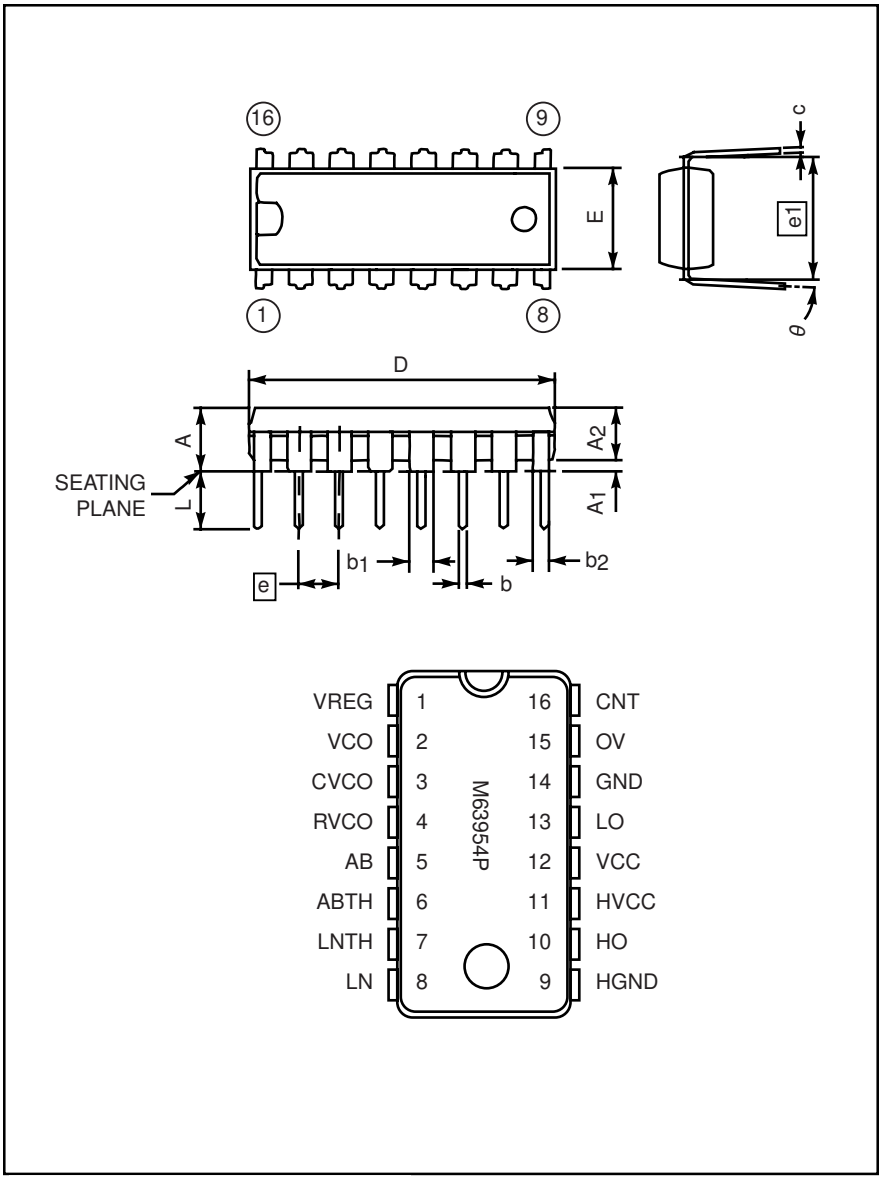
M63954P

HVIC
Half-Bridge Driver



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
e1	0.31	7.62
L	0.12 Min.	3.0 Min.
θ	0° – 15°	0° – 15°

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.

Absolute Maximum Ratings, T_a = 25°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°C, On Board	1.67	W
Linear Derating Factor	$K\Theta$	T_a > 25°C, On Board	13.3	mW/°C
Junction Temperature	T_j		150	°C
Operation Temperature	T_{opr}		-20 ~ 80	°C
Storage Temperature	T_{stg}		-40 ~ 125	°C

Output Frequency, R_{VCO1} = 15kΩ, R_{VCO2} = 39kΩ, C_{VCO} = 100pF

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

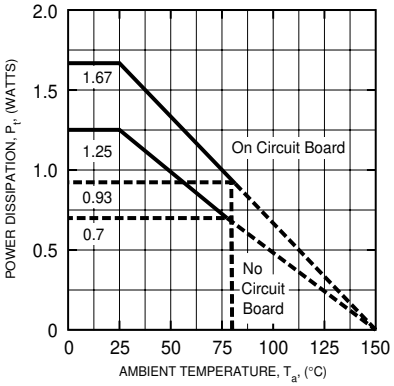
Electrical Characteristics, H_{GND} = GND, H_{VCC} = V_{CC} = 15V, T_a = 25°C, unless otherwise specified

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} = 15kΩ, V_{VCO} = 0.33 V_{REG}	2	5	8	mA
ON Oscillation Current (115kHz)	I_{CC4}	R_{VCO2} = 39kΩ 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_{rRVCO}	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

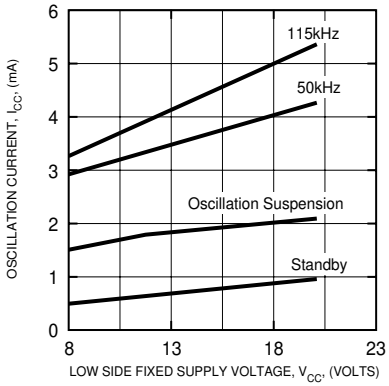
Electrical Characteristics, H_{GND} = GND, H_{VCC} = V_{CC} = 15V, T_a = 25°C, unless otherwise specified

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	VCNTh		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% → 90%, C = 1000pF	—	50	120	ns
Output Fall Time	t_f	Amplitude 90% → 10%, C = 1000pF	—	50	120	ns

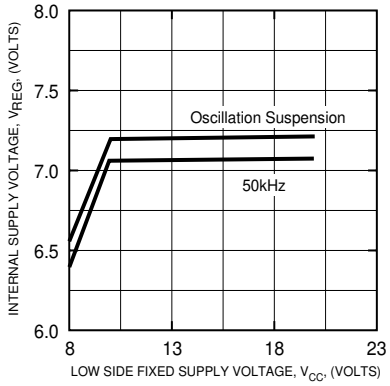
THERMAL DERATING FACTOR CHARACTERISTICS (TYPICAL)



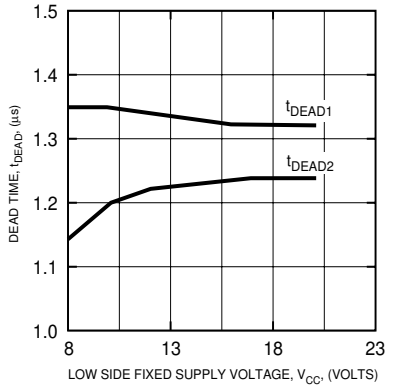
I_{CC} VS. V_{CC} CHARACTERISTIC



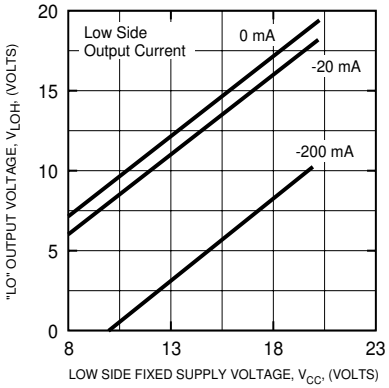
V_{REG} VS. V_{CC} CHARACTERISTIC



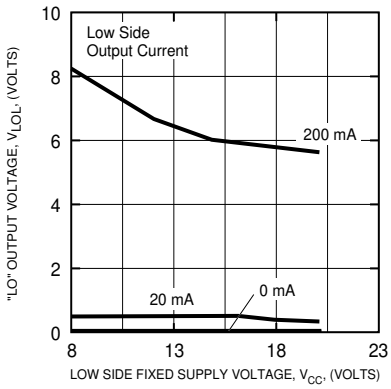
t_{DEAD} VS. V_{CC} CHARACTERISTIC



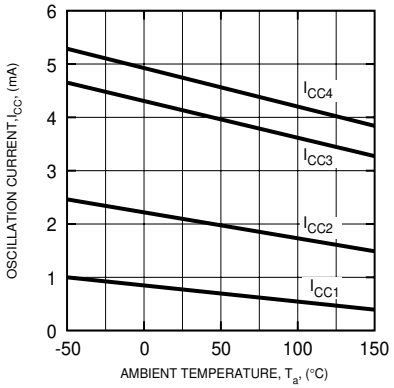
V_{LOH} VS. V_{CC} CHARACTERISTIC



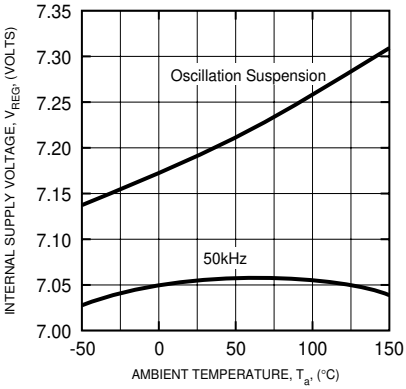
V_{LOL} VS. V_{CC} CHARACTERISTIC



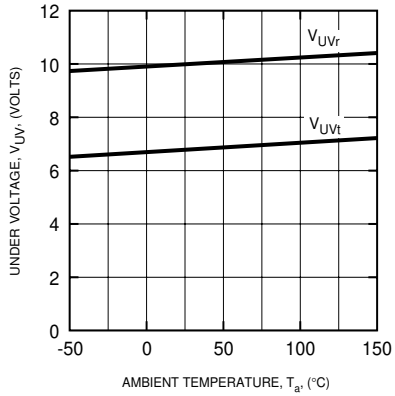
I_{CC} VS. T_a CHARACTERISTIC



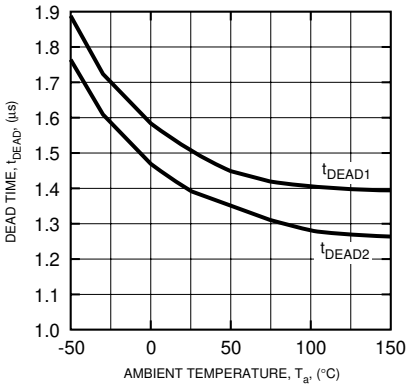
V_{REG} VS. T_a CHARACTERISTIC



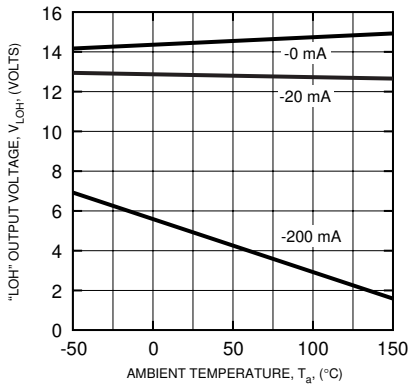
V_{UV} VS. T_a CHARACTERISTIC



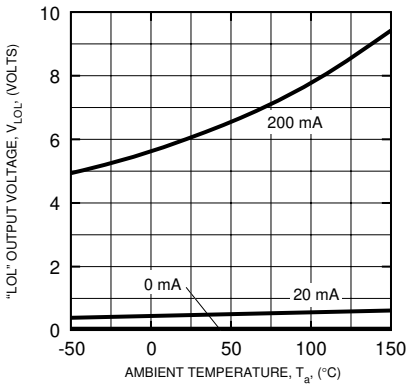
t_{DEAD} VS. T_a CHARACTERISTIC



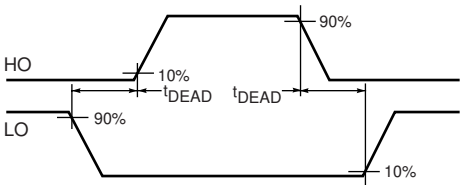
V_{LOH} VS. T_a CHARACTERISTIC



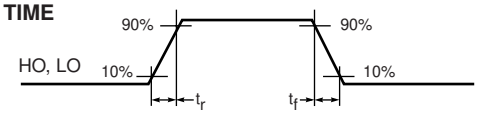
V_{LOL} VS. T_a CHARACTERISTIC



DEAD TIME



OUTPUT RISE TIME
FALL TIME



BLOCK DIAGRAM