



Product Preview

SMARTMOS[®]

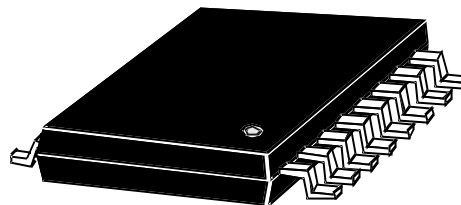
1 Channel H-Bridge Driver IC

MPC17511 is a monolithic type SMOS5AP SMARTMOS IC built in 1channel H-Bridge Driver constituted LDMOSFET, input section can be directly interfaced from the MCU.

This IC can control 4 mode output function (Forward, Reverse, Brake, Open) by input logic.

This IC can drive various type of micro motor and low loss.

MPC17511

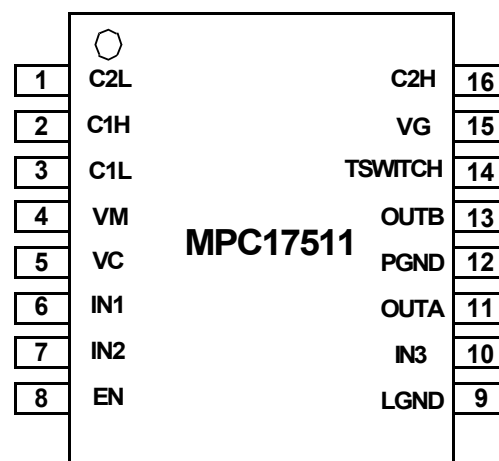


16PIN SVM

Features

- Manufactured by SMOS5AP process technology
- Built in 1 Channel Circuit of H-Bridge Driver
- Built in Charge-pump Circuit
- 4 Mode Drive(Forward, Reverse, Brake, Open)
- Direct Interface from the MCU
- Low ON-Resistance Ron=0.6 ohm(Max.)
- IDR=1.0A (Cont.)
- Low Consumption Power
- Built in Shoot Through Current Prevention Circuit
- Built in Low Voltage Shutdown Circuit
- PWM Control frequency 200kHz(Max.)
- Comes in 16-pin VMFP (pin pitch : 0.65mm)

Pin Connections

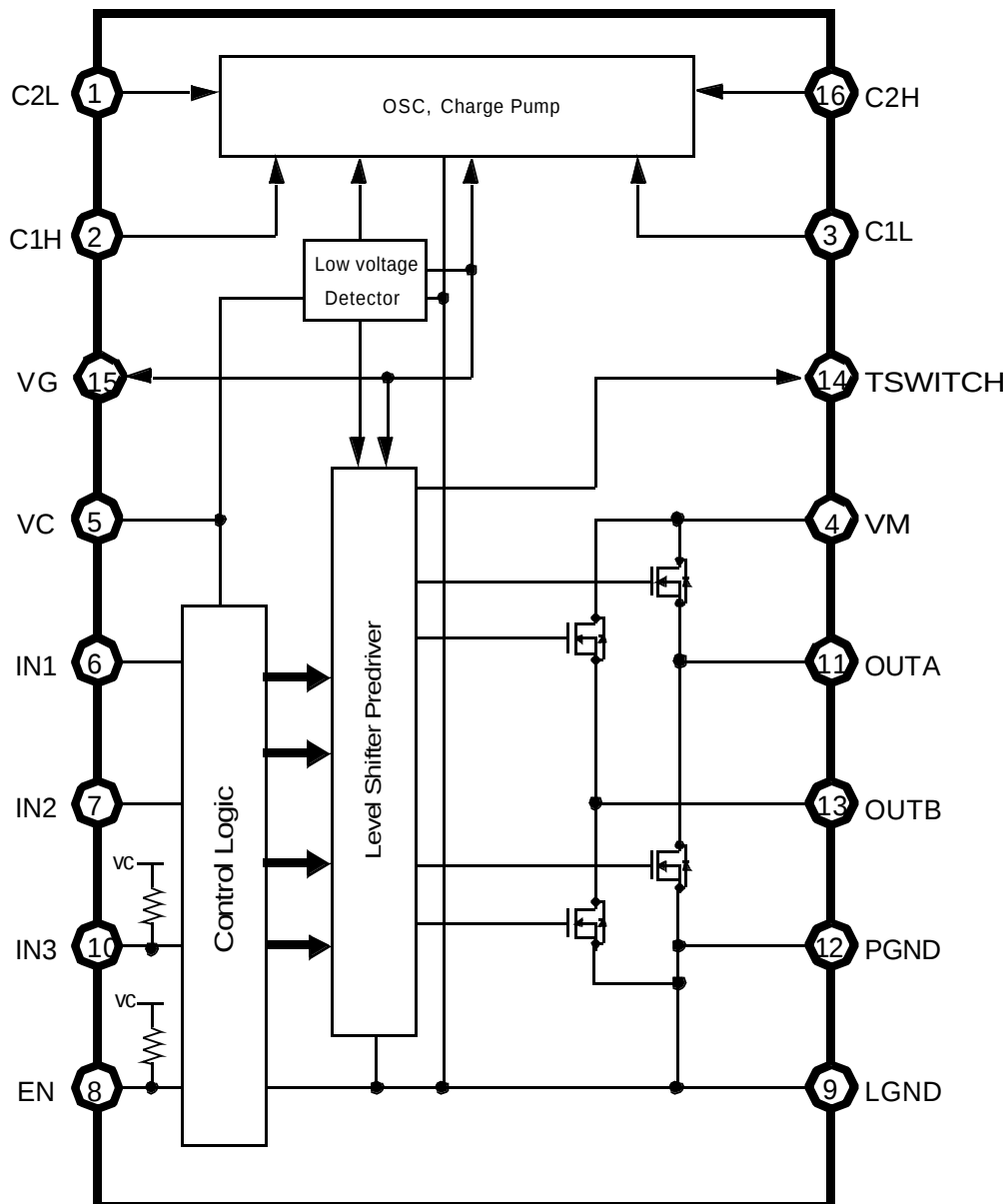


(Top View)

*SMARTMOS is a registered trademark of Motorola Inc.

*Specifications in this data sheet may be changed without prior notice.

Block Diagram



*Each GND pin are connected by Metal.

Function Table

Z : High impedance X : Don't care

EN	IN1	IN2	IN3	OUTA	OUTB	TSWITCH
H	H	H	X	L	L	X
H	H	L	X	H	L	X
H	L	H	X	L	H	X
H	L	L	X	Z	Z	X
L	X	X	X	L	L	L
H	X	X	H	X	X	L
H	X	X	L	X	X	H

Maximum Ratings ^{*1}

Rating	Symbol	Min.	Max.	Unit
Driver Circuit Power Supply Voltage	VM	- 0.5	8.0	V
Pre-Driver Circuit Power Supply Voltage	VG	- 0.5	14.0	V
Control Circuit Power Supply Voltage	VC	- 0.5	7.0	V
Signal Input Voltage	VIN	- 0.5	VC+0.5	V
Driver Output Current (continuous)	IDR	---	1.0	A
Driver Output Current (pulsed) ^{*2}	IDRp	---	3.0	A
Operating Junction Temperature	Tj	- 55	150	degC
Storage Temperature Range	Tstg	---	150	degC
Thermal Resistance ^{*3}	R θ ja	150		deg./W
Power Dissipation ^{*4}	PD	---	830	mW

*1) Device may be damaged when used over the ratings.

*2) Ta=25C, Peak time is within 10ms at intervals 0.2seconds.

*3) 37 X 50 X 1.6[mm] glass EPOXY Board mount.

*4) Ta=25C

Recommended Operating Condition

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Driver Circuit Power Supply Voltage	VM	2.0	5.0	6.8	V
Control Circuit Power Supply Voltage	VC	2.7	5.0	5.7	V
Signal Input Voltage	VIN	0	---	VC	V
Pulse Input Frequency	FIN	---	---	200	kHz
Input Pulse Rise Time	TR	---	---	1.0	us
Input Pulse Fall Time	TF	---	---	1.0	us
Operating Ambient Temperature	Topr	-20	25	65	°C
Capacitor for Charge Pump	C1,C2,C3	0.01	0.1	1.0	uF
Pre-Driver Circuit Power Supply Voltage	VG	12	13	13.5	V

DC CHARACTERISTICS (Ta=25C, VC=VM=5.0V, GND=0V)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Test circuit	
Quiescent Power Supply Current	IMO	---	---	1.0	uA	A	*1
Driver Circuit Power Supply Current							
Control Circuit Power Supply Current							
Active Power Supply Current	IC	---	---	3.0	mA	G	*2
Control Circuit Power Supply Current							
Pre-Driver Circuit Power Supply Current							
Logic Input Function	VIH VIL IIH IIL	VCx0.7 --- --- - 1.0	--- --- --- ---	--- VCx0.3 1.0 ---	V V uA uA	B	*3
High Level Input Voltage							
Low Level Input Voltage							
High Level Input Current							
Low Level Input Current							
Driver Output ON Resistance	RON	---	0.46	0.60	ohm	D	*4
Pullup Resistance (EN,IN3)	Rup	50	100	200	kohm		
Charge-pump Output Voltage	VG	12	12.8	13	V	C	*5
Charge-pump Output Voltage (IG=-1mA)	VGload	10	11.2	---	V	E	
Low Voltage Detection Circuit Detection Voltage	VCDET	1.5	2.0	2.5	V	F	*6
TSWITCH OUT	VOH VOL	VG-0.5 LGND	VG-0.1 LGND+0.1	VG LGND+0.5	V V	B	
IOUT=-50uA IIN=50uA							

*1) ICO includes current to the pre-driver circuit.

*2) IC includes current to the pre-driver circuit. IC:Fin100kHz. IG:Fin20kHz.

*3) 2.7V < VC < 5.7V *4) IDR=1.0[A] source+sink *5) When no input logic signal.

*6) Detection voltage is defined output become High-impedance when VC voltage is dropped.

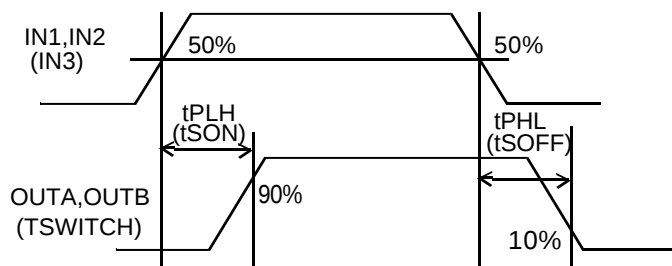
When the gate voltage VG is applied from an external source, VG=7.5[V]

AC CHARACTERISTICS (Ta=25C, VC=VM=5.0V, GND=0V)

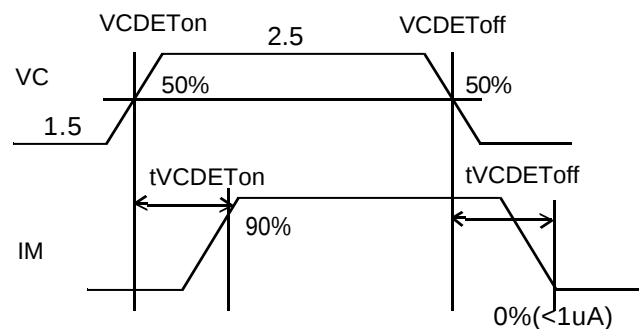
Characteristics	Symbol	Min.	Typ.	Max.	Unit	Test circuit	
Output Propagation Delay Time	tPLH tPHL	---	0.1 0.1	0.5 0.5	us us	D	
Turn-ON time							
Turn-Off time							
TSWITCH Propagation Delay Time	tSON tSOFF	---	0.15 0.15	0.5 0.5	us us	C2	
Turn-ON time							
Turn-Off time							
Charge-pump Circuit Rise time	tVGON	---	1.0	3.0	ms	C	*1
Low Voltage Detection Circuit Detection time	tVCDET	---	---	10	ms	F	

*1) When C1=C2=C3=0.1[uF]

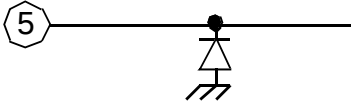
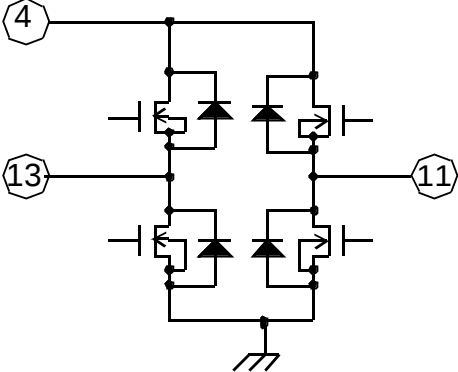
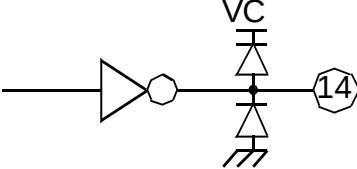
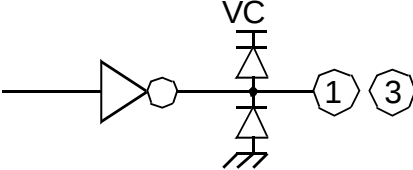
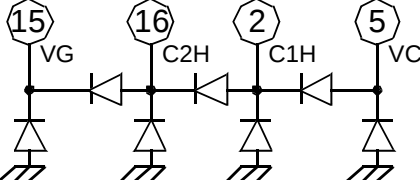
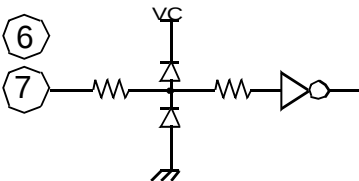
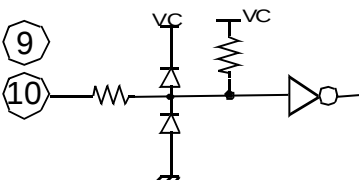
tPLH,tPHL (tSON,tSOFF)Timing Chart



tVCDET Timing Chart

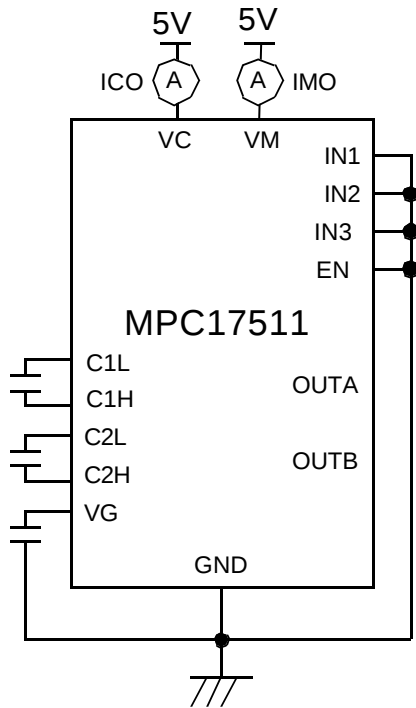


Pin Description

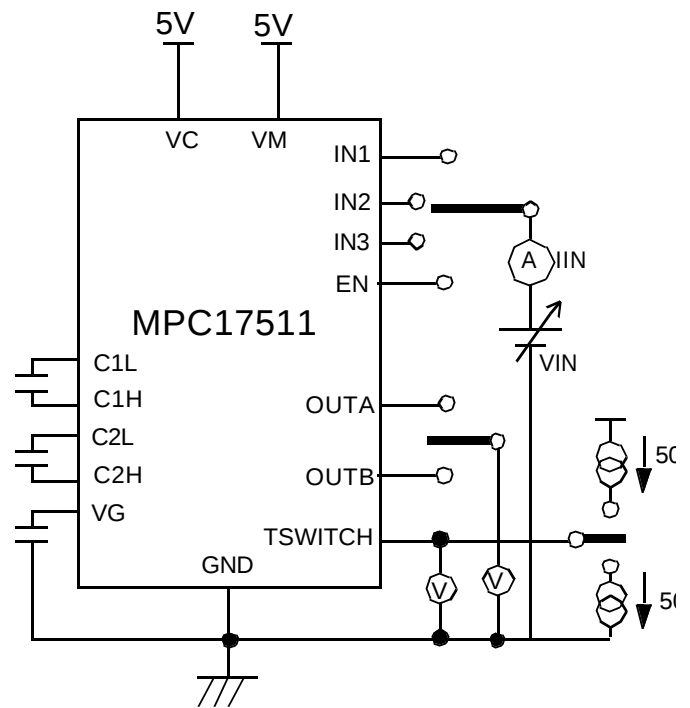
Symbol	PIN No.	Simplified Circuit Schematic	Function
VC	5		Control Circuit Power Supply Pin
VM	4		Driver Power Supply Voltage Input Pin
OUTA	11		Driver Output Pin
OUTB	13		Driver Output Pin
TSWITCH	14		Output pin of step-up voltage
C1L	3		These pins connect to charge pump capacitors. (Negative pole)
C2L	1		
C1H	2		These pins connect to charge pump capacitors. (Positive pole)
C2H	16		Pre-Driver Circuit Power Supply Pin
VG	15		
IN1	6		Control Signal Input Pin 1
IN2	7		Control Signal Input Pin 2
EN	8		Enable Control Signal Input Pin
IN3	10		Control Signal Input Pin 3 for TSWITCH
LGND	9	Logic GND Pin	
PGND	12	Driver GND Pin	

Test Circuit

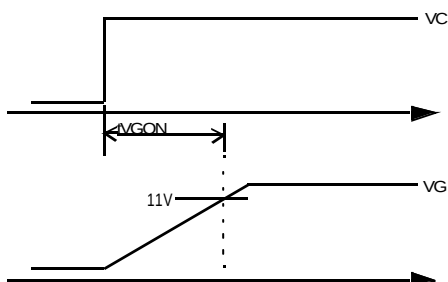
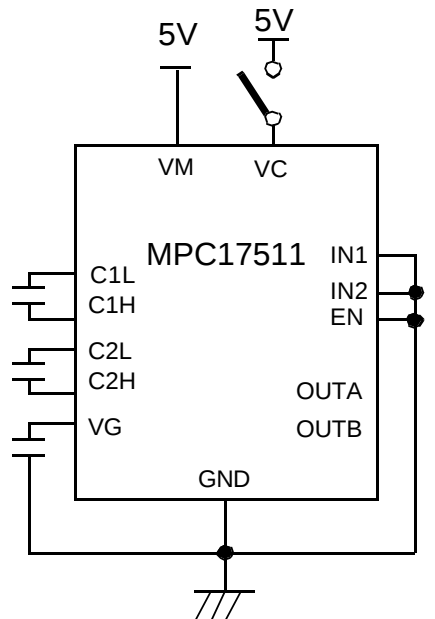
Capacitor for charge pump (C1,C2.C3)= 0.1[μF]



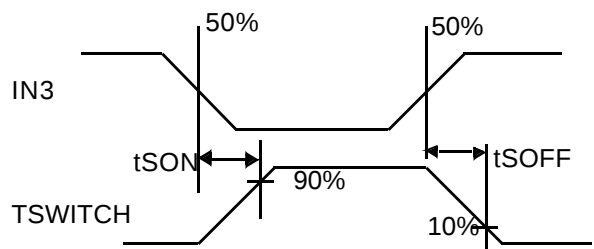
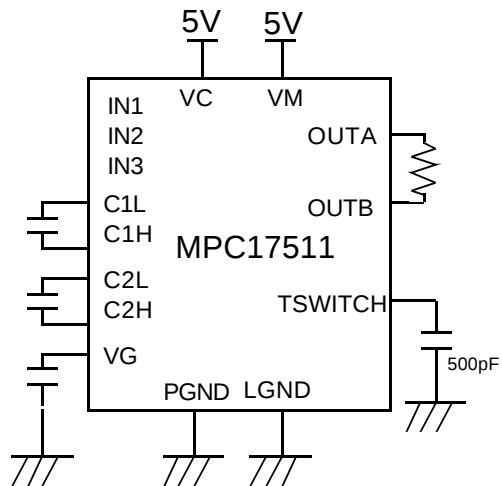
Test Circuit A



Test Circuit B

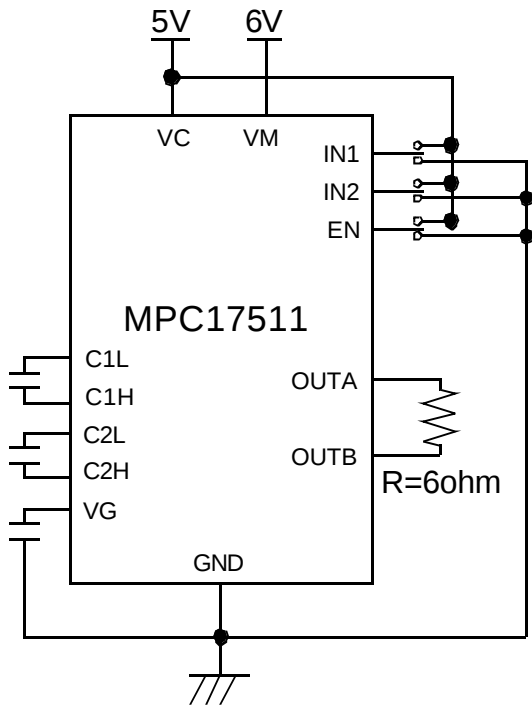


Test Circuit C

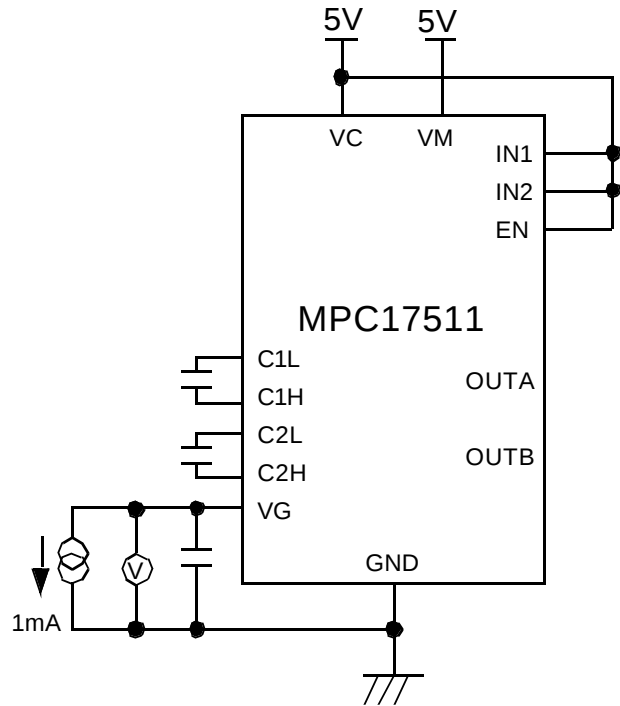


Test Circuit C2

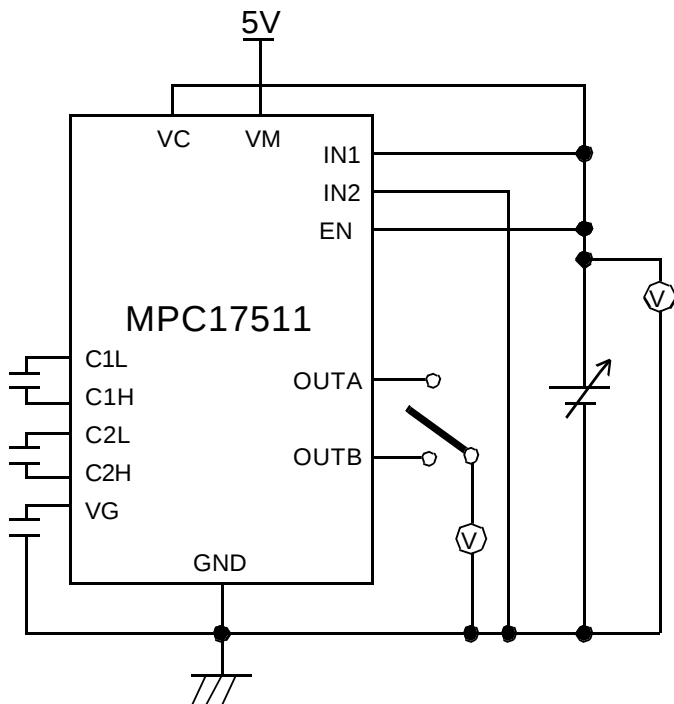
Capacitor for charge pump (C1,C2.C3)= 0.1[uF]



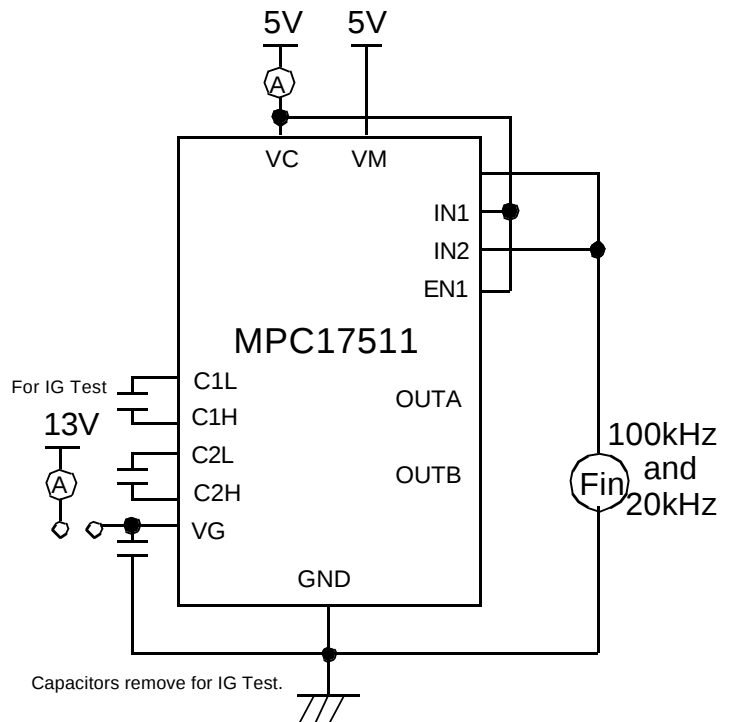
Test Circuit D



Test Circuit E



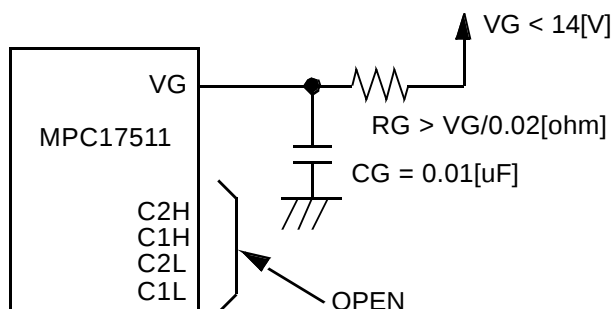
Test Circuit F



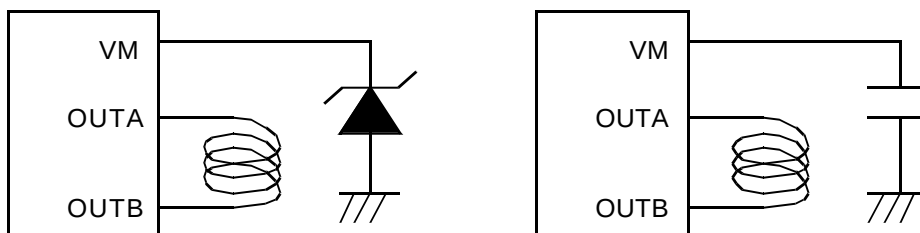
Test Circuit G

Precautions on Application

- (1)When applying the gate voltage V_G from an external source, be sure to connect it via a resistor equal to or greater than $R_G = V_G/0.02[\text{ohm}]$. However, this resistance is unnecessary if you are connecting a charge pump output from a SMARTMOS product.



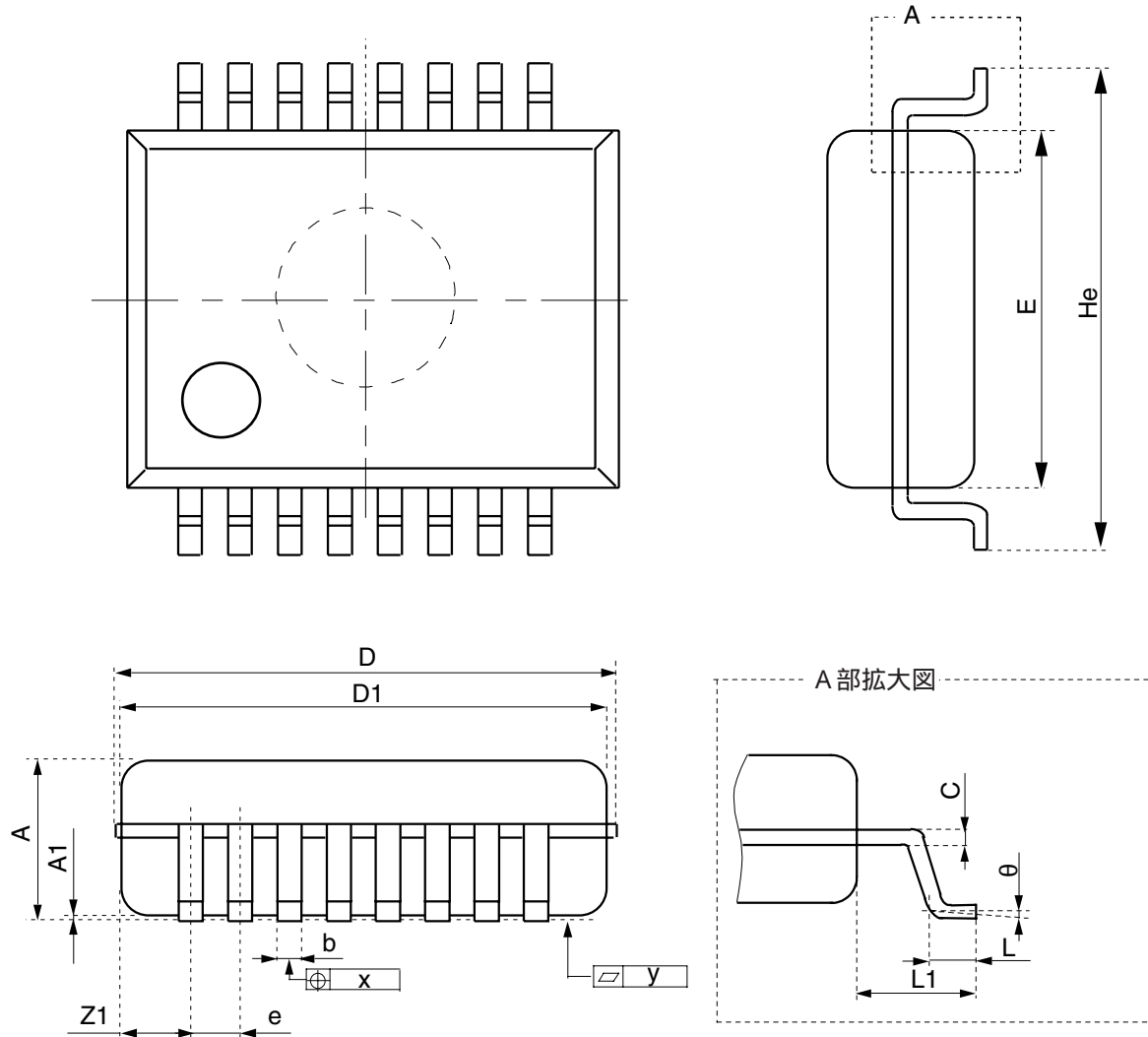
- (2)Switching from the state of active current loading to high-impedance mode, inductance load and P.C.B. layout may induce over maximum ratings to a power supply pin. Zener diode or capacitor at VM pin will protect kick back voltage(it depends on the inductance load). The schottky diode at output pin will also protect it.



- (3)Connect a capacitor of sufficient capacitance between the power supply and ground pins. For all large-current paths, use sufficiently wide copper conductor patterns and route them in the shortest distance possible.

- (4)When using SMARTMOS products in your circuit design, make sure they are fully protected against static charge.

■ 16 ピン SVMFP 外形寸法図



	SPEC		
	MIN	TYP	MAX
A	*****	1.95	2.05
A1	0.10	0.15	0.20
b	0.25	0.30	0.35
C	0.18	0.20	0.25
D	*****	5.45 MAX	
D1	5.20	5.25	5.30
e	0.60	0.65	0.70
E	5.25	5.30	5.35
He	7.70	7.90	8.10
L	0.45	0.60	0.75
L1	1.20	1.30	1.40
x	*****	*****	0.12
y	0.05		
Z1	0.25	0.35	0.47
θ	0.0 °	4.0 °	9.8 °

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