

MONOLITHIC H BRIDGE DRIVER CIRCUIT

DESCRIPTION

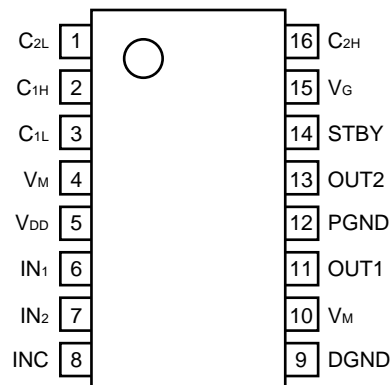
The  $\mu$ PD16804 is a monolithic H bridge driver IC which uses low-ON resistance power MOS FETs in its driver stage. This driver has a forward, reverse, and brake functions and is ideal for the driver circuit of motors for camera that advance or rewind the film, and auto focusing or zooming.

This IC supports a drive current of up to 0.5 A (DC).

FEATURES

- High drive current  
 $I_{DR} = 3 \text{ A MAX. at } PW \leq 200 \text{ ms (single pulse)}$   
 $I_{DR} = 0.5 \text{ A (DC)}$
- Low-ON resistance (sum of ON resistances of top and bottom MOS FET)  
 $R_{ON} = 0.6 \Omega \text{ TYP. at } I_{DR} = 0.5 \text{ A}$
- Standby function that turns OFF charge pump circuit
- Compact surface mount package  
 16-pin plastic SOP (300 mil)

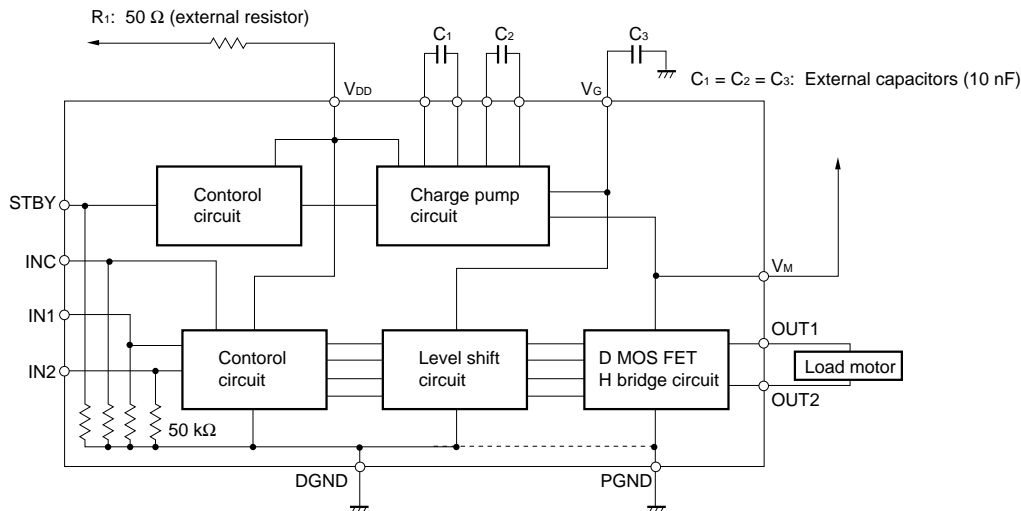
PIN CONFIGURATION (Top View)



ORDERING INFORMATION

Part Number	Package
$\mu$ PD16804GS	16-pin plastic SOP (300 mil)

BLOCK DIAGRAM



The information in this document is subject to change without notice.

**ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Conditions	Rating	Unit
Supply voltage	V <sub>DD</sub>		-0.5 to +6.5/+8.0 <sup>Note</sup>	V
	V <sub>M</sub>		-0.5 to +6.5/+8.0 <sup>Note</sup>	
V <sub>G</sub> pin applied voltage	V <sub>G</sub>		15	V
Input voltage	V <sub>IN</sub>		-0.5 to V <sub>DD</sub> + 0.5	V
H bridge drive current	I <sub>DR1</sub>	DC	0.5	A
	I <sub>DR2</sub>	PW ≤ 200 ms (single pulse)	3.0	A
Power consumption	P <sub>T</sub>	T <sub>A</sub> = 25 °C	1.0	W
Operating temperature range	T <sub>A</sub>		-30 to +60	°C
Operating junction temperature	T <sub>J (MAX)</sub>		150	°C
Storage temperature range	T <sub>stg</sub>		-55 to +150	°C

**Note** V<sub>DD</sub> when the charge pump is used/V<sub>DD</sub> and V<sub>M</sub> when V<sub>G</sub> is supplied from an external source

**RECOMMENDED OPERATING CONDITIONS**

Parameter	Symbol	Conditions	Ratings			Unit
			MIN.	TYP.	MAX.	
Supply voltage	V <sub>DD</sub>	During normal operation	3.0		6.0/7.5 <sup>Note 2</sup>	V
		All input pins are low	2.5			
	V <sub>M</sub>		0.5		7.5	V
Charge pump capacitance	C <sub>1</sub> to C <sub>3</sub>			10		nF
V <sub>G</sub> pin applied voltage <sup>Note 1</sup>	V <sub>G</sub>		11		14	V
Operating temperature	T <sub>A</sub>	Ambient temperature	-30		60	°C

**Notes** 1. When a voltage is applied from an external source to the V<sub>G</sub> pin

2. When the charge pump is used/when V<sub>G</sub> is supplied from an external source

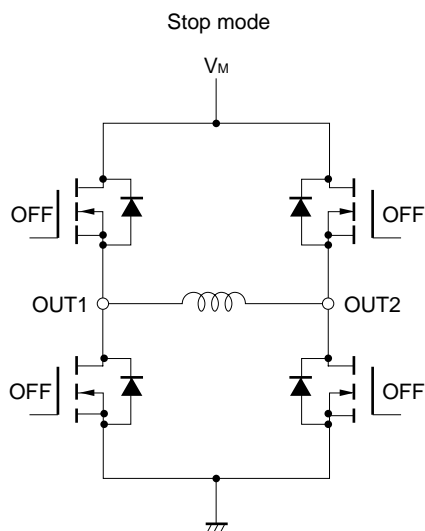
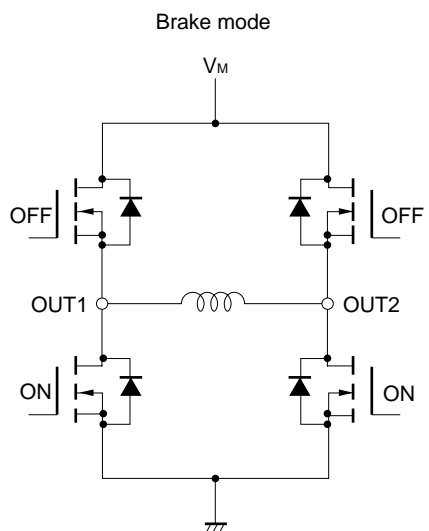
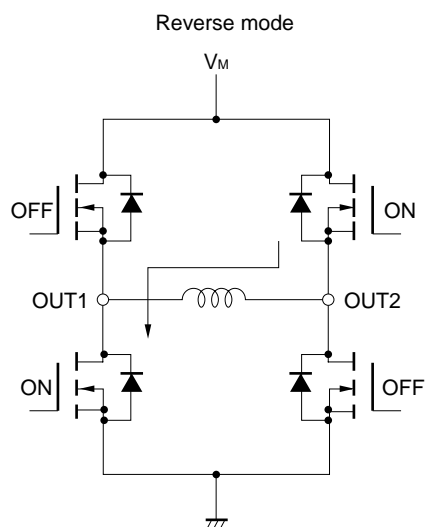
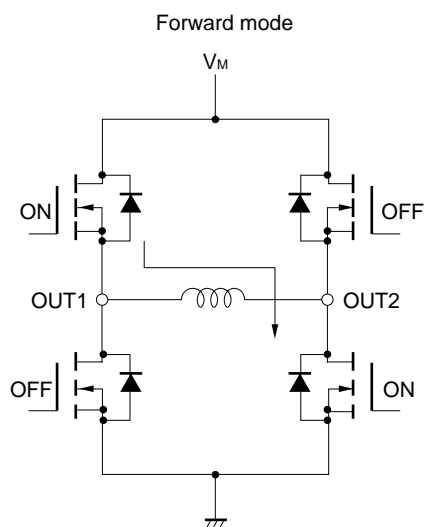
**ELECTRICAL SPECIFICATIONS (Unless otherwise specified, T<sub>A</sub> = 25 °C, V<sub>DD</sub> = recommended operating condition, V<sub>M</sub> = 0.5 to 7.5 V)**

Parameter	Symbol	Conditions	Ratings			Unit
			MIN.	TYP.	MAX.	
V <sub>DD</sub> pin current	I <sub>DD1</sub>	V <sub>DD</sub> = 5 V, T <sub>A</sub> = recommended conditions Control pins at high level		0.6	2.0	mA
	I <sub>DD2</sub>	V <sub>DD</sub> = 5 V, T <sub>A</sub> = recommended conditions Control pins at low level		0.3	10	μA
V <sub>M</sub> pin current	I <sub>M1</sub>	Control pins at low level T <sub>A</sub> = recommended conditions		0.1	10	μA
	I <sub>M2</sub>	Control pins at low level			1.0	μA
H bridge ON resistance <sup>Note</sup>	R <sub>ON</sub>	I <sub>DR</sub> = 0.5 A, V <sub>DD</sub> = V <sub>M</sub> = 5 V		0.6	0.8	Ω
Control pin high-level input voltage	V <sub>IH</sub>	T <sub>A</sub> = recommended condition	V <sub>DD</sub> × 0.6			V
Control pin low-level input voltage	V <sub>IL</sub>	T <sub>A</sub> = recommended condition			V <sub>DD</sub> × 0.2	V
Charge pump circuit turn-ON time	t <sub>ONG</sub>	V <sub>DD</sub> = V <sub>M</sub> = 5 V, T <sub>A</sub> = recommended conditions C <sub>1</sub> = C <sub>2</sub> = C <sub>3</sub> = 10 nF I <sub>DR</sub> = 0.5 A		0.5	1.0	ms
H bridge output circuit turn-ON time	t <sub>ONH</sub>				10	μs
H bridge output circuit turn-OFF time	t <sub>OFFH</sub>				5.0	μs
Control pin input pull-down resistor	R <sub>IND</sub>		35	50	65	kΩ
		T <sub>A</sub> = recommended condition	25		75	kΩ

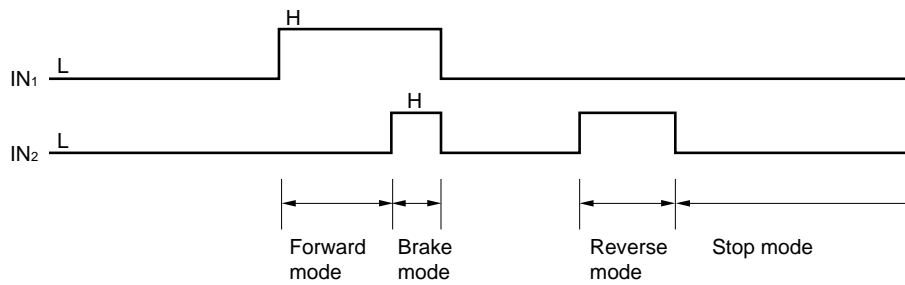
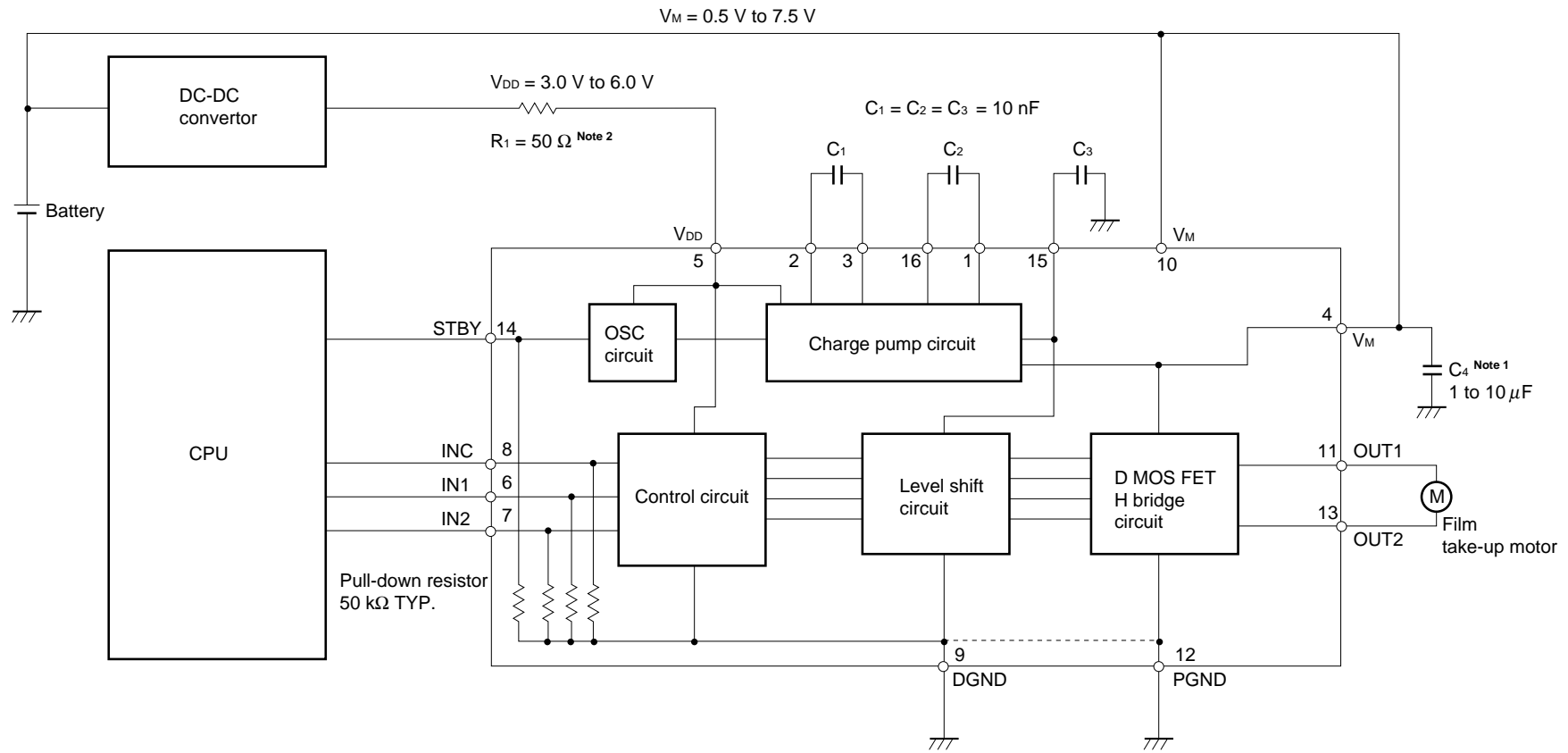
**Note** Sum of ON resistances of top and bottom MOS FETs

FUNCTION TABLE

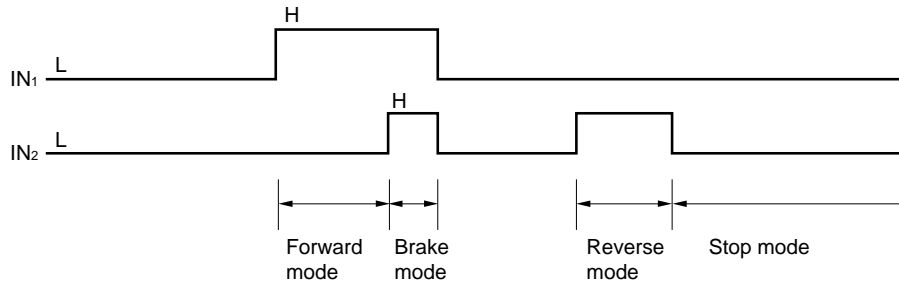
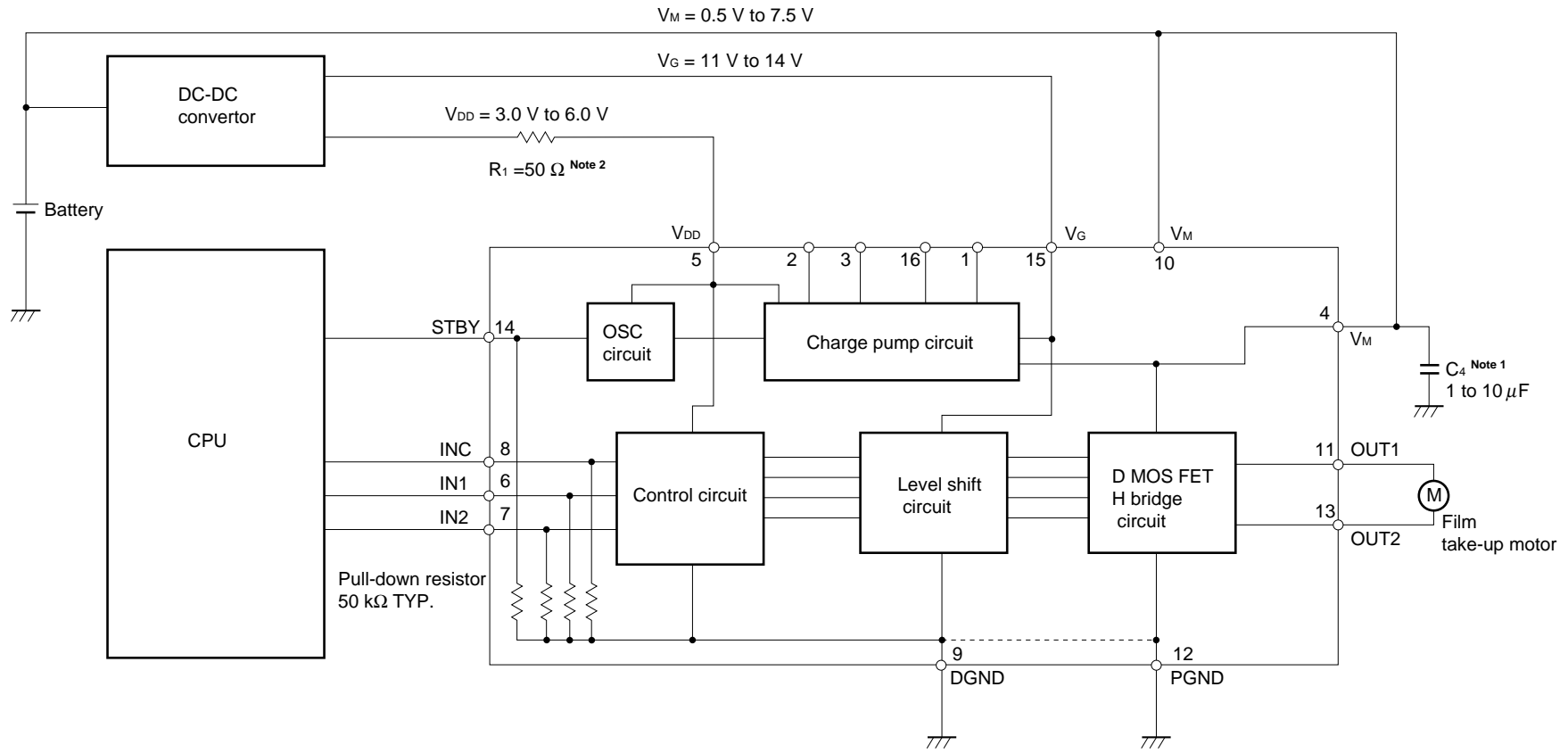
Input Signal				Function
IN1	IN2	INC	STB	
H	L	H	H	Forward mode
L	H	H	H	Reverse mode
H	H	H	H	Brake mode
L	L	H	H	Stop mode
×	×	L	H	Stop mode
×	×	×	L	Standby mode



APPLICATION CIRCUIT 1

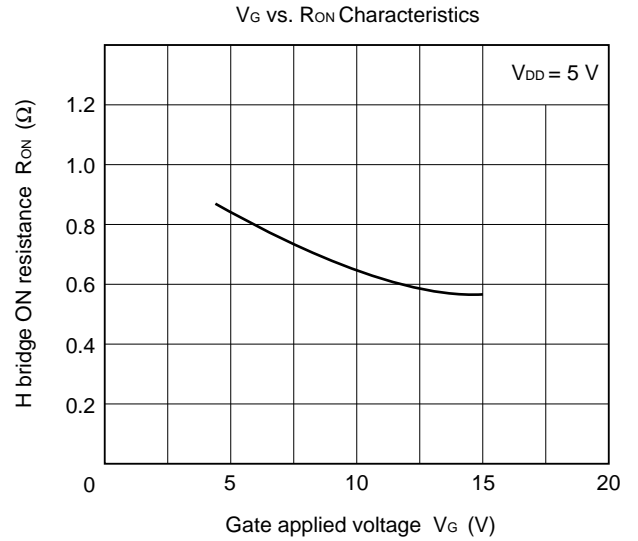
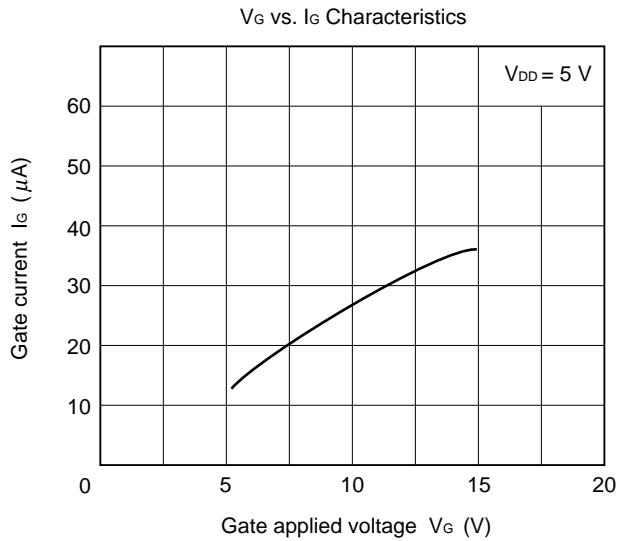
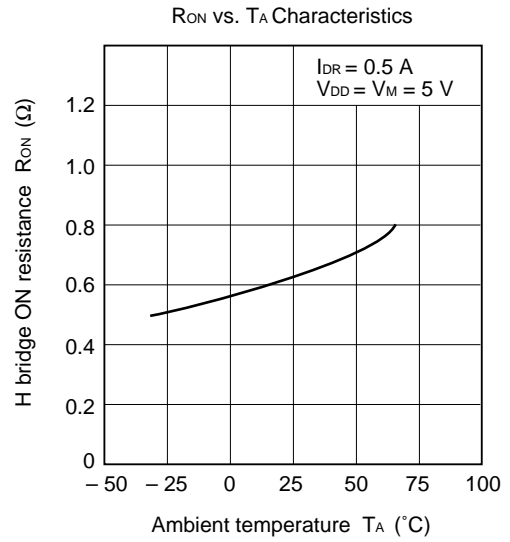
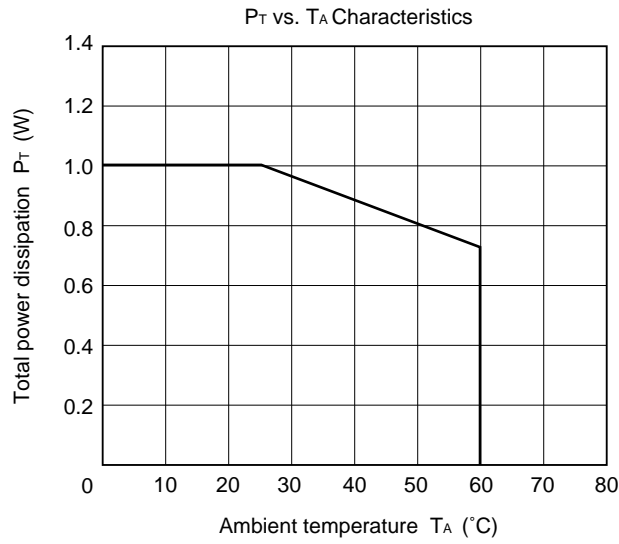


- Notes**
1. It is recommended to connect a capacitor of 1 to 10  $\mu\text{F}$  between  $V_M$  and GND to protect the gate of the DMOS FET from surge voltage.
  2. Insert a resistor of 50 ( $\pm 10$ )  $\Omega$  to prevent malfunctioning.



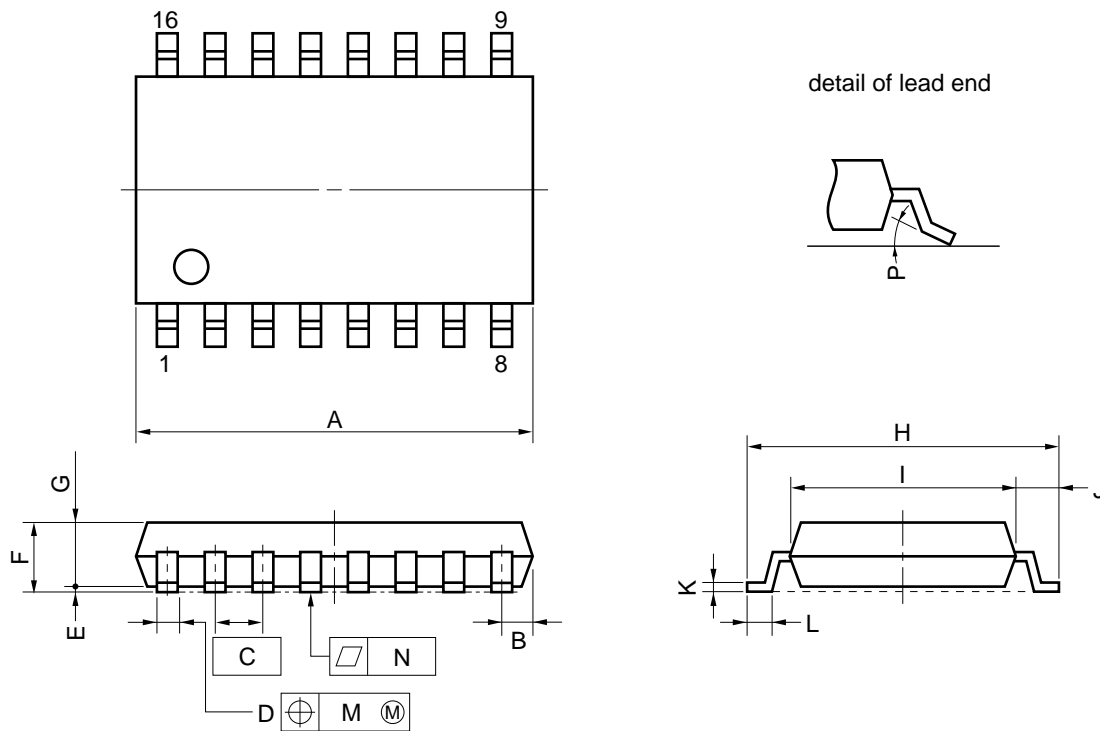
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TYPICAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ )



PACKAGE DIMENSION

16 PIN PLASTIC SOP (300 mil)



NOTE

Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	10.46 MAX.	0.412 MAX.
B	0.78 MAX.	0.031 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40 <sup>+0.10</sup> <sub>-0.05</sub>	0.016 <sup>+0.004</sup> <sub>-0.003</sub>
E	0.1±0.1	0.004±0.004
F	1.8 MAX.	0.071 MAX.
G	1.55	0.061
H	7.7±0.3	0.303±0.012
I	5.6	0.220
J	1.1	0.043
K	0.20 <sup>+0.10</sup> <sub>-0.05</sub>	0.008 <sup>+0.004</sup> <sub>-0.002</sub>
L	0.6±0.2	0.024 <sup>+0.008</sup> <sub>-0.009</sub>
M	0.12	0.005
N	0.10	0.004
P	3° <sup>+7°</sup> <sub>-3°</sub>	3° <sup>+7°</sup> <sub>-3°</sub>

P16GM-50-300B-4



**RECOMMENDED SOLDERING CONDITIONS**

It is recommended to solder this product under the conditions described below.  
 For soldering methods and conditions other than those listed below, consult NEC.

**Surface mount type**

For the details of the recommended soldering conditions of this type, refer to **Semiconductor Device Mounting Technology Manual (C10535E)**.

**μPD16804GS**

Soldering Method	Soldering Conditions	Symbol of Recommended Soldering
Infrared reflow	Peak package temperature: 235 °C, Time: 30 seconds MAX. (210 °C MIN.), Number of times: 2 MAX.	IR35-00-2
VPS	Peak package temperature: 215 °C, Time: 40 seconds MAX. (200 °C MIN.), Number of times: 2 MAX.	VP15-00-2
Wave soldering	Soldering bath temperature: 260 °C Time: 10 seconds MAX., Preheating temperature: 120 °C MAX. (package surface temperature), Number of times: 1	WS60-00-1

**Note** The number of storage days at 25 °C, 65% RH after the dry pack has been opened

**Caution** Do not use two or more soldering methods in combination (except pin partial heating).

[MEMO]

[MEMO]

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Anti-radioactive design is not implemented in this product.