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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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MONOLITHIC H BRIDGE DRIVER CIRCUIT

DESCRIPTION

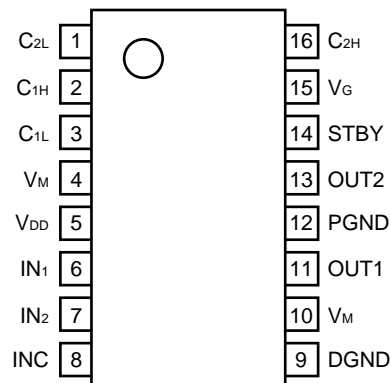
The μ PD16804 is a monolithic H bridge driver IC which uses low-ON resistance power MOS FETs in its driver stage. This driver has a forward, reverse, and brake functions and is ideal for the driver circuit of motors for camera that advance or rewind the film, and auto focusing or zooming.

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)

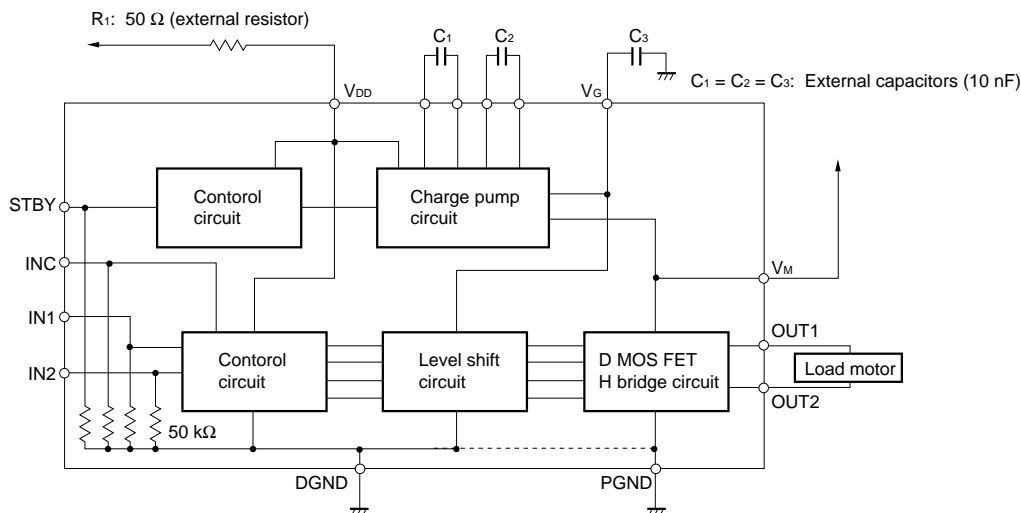
PIN CONFIGURATION (Top View)



ORDERING INFORMATION

Part Number	Package
μ 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_{DD}		-0.5 to +6.5/+8.0 ^{Note}	V
	V_M		-0.5 to +6.5/+8.0 ^{Note}	
V_G pin applied voltage	V_G		15	V
Input voltage	V_{IN}		-0.5 to $V_{DD} + 0.5$	V
H bridge drive current	I_{DR1}	DC	0.5	A
	I_{DR2}	$PW \leq 200$ ms (single pulse)	3.0	A
Power consumption	P_T	$T_A = 25$ °C	1.0	W
Operating temperature range	T_A		-30 to +60	°C
Operating junction temperature	$T_{J(MAX)}$		150	°C
Storage temperature range	T_{stg}		-55 to +150	°C

Note V_{DD} when the charge pump is used/ V_{DD} and V_M when V_G is supplied from an external source

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Conditions	Ratings			Unit
			MIN.	TYP.	MAX.	
Supply voltage	V_{DD}	During normal operation	3.0		6.0/7.5 ^{Note 2}	V
		All input pins are low	2.5			
	V_M		0.5		7.5	V
Charge pump capacitance	C_1 to C_3			10		nF
V_G pin applied voltage ^{Note 1}	V_G		11		14	V
Operating temperature	T_A	Ambient temperature	-30		60	°C

Notes 1. When a voltage is applied from an external source to the V_G pin

2. When the charge pump is used/when V_G is supplied from an external source

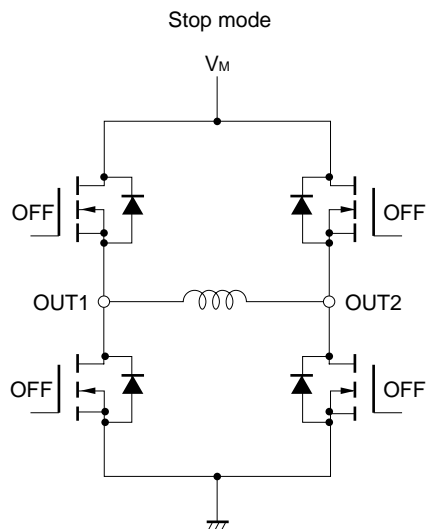
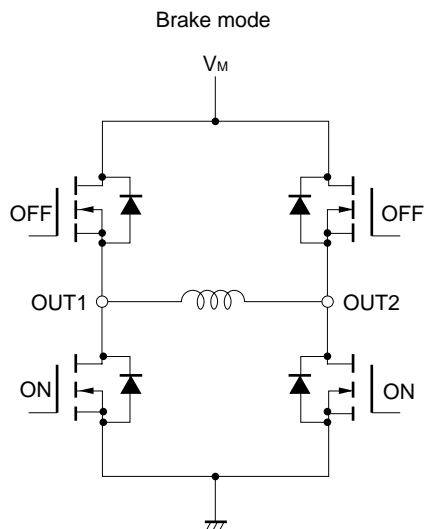
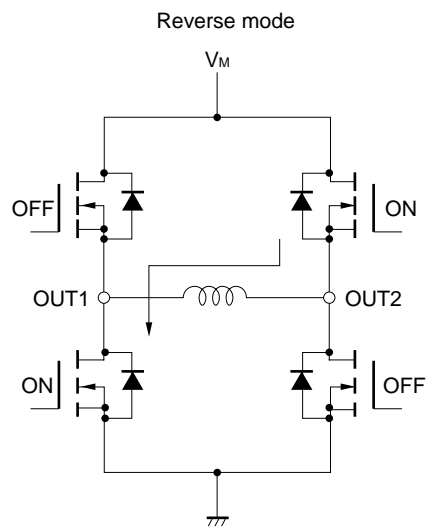
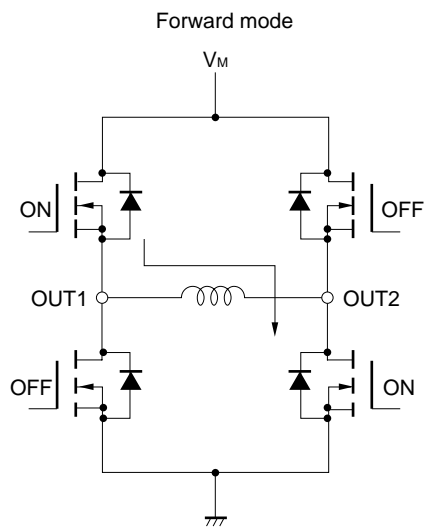
ELECTRICAL SPECIFICATIONS (Unless otherwise specified, T_A = 25 °C, V_{DD} = recommended operating condition, V_M = 0.5 to 7.5 V)

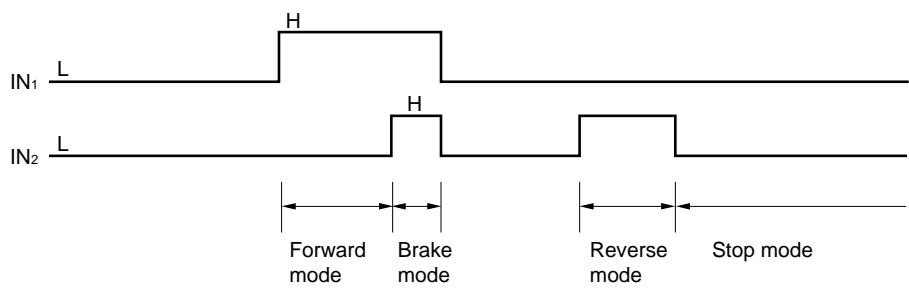
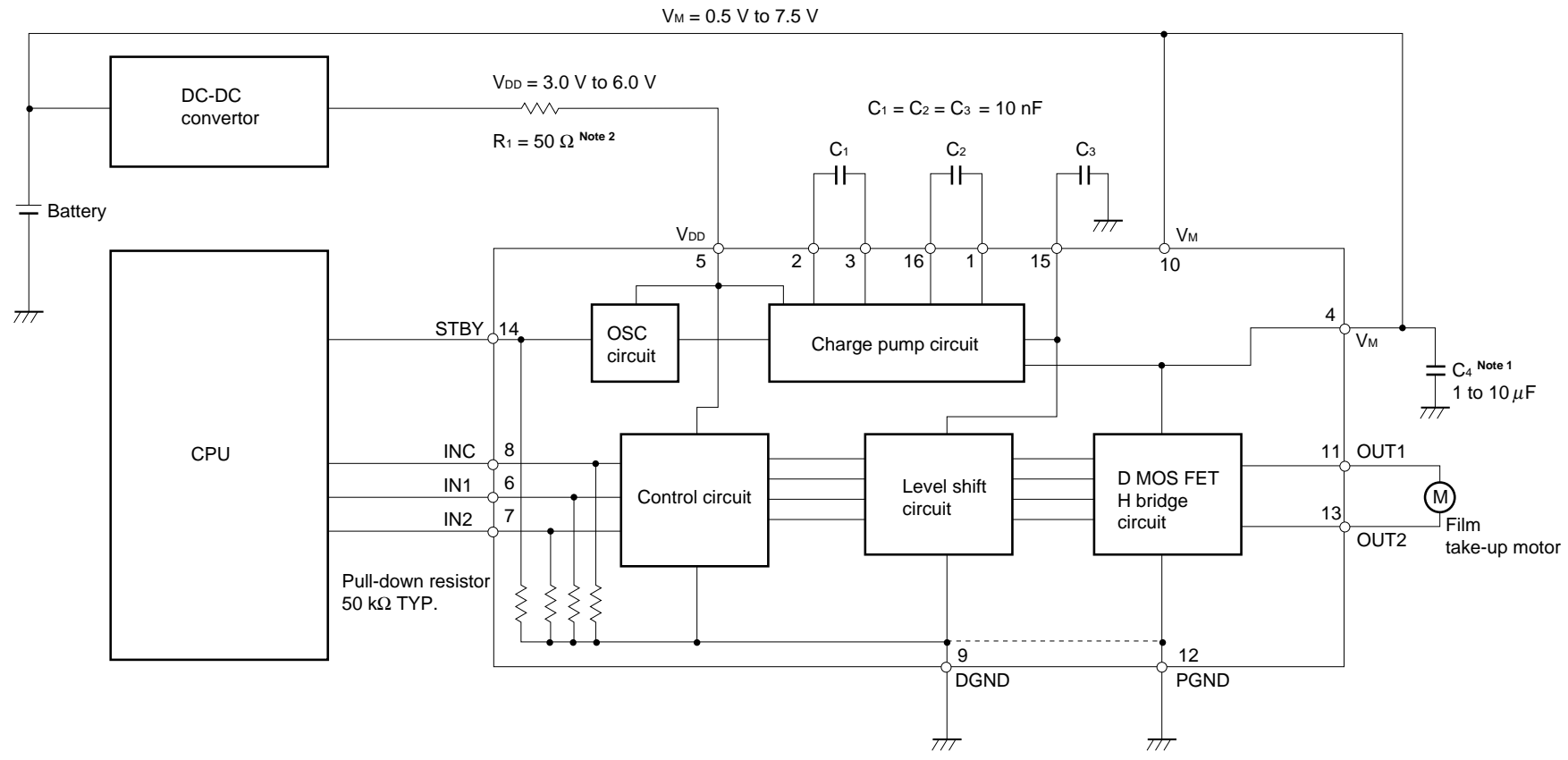
Parameter	Symbol	Conditions	Ratings			Unit
			MIN.	TYP.	MAX.	
V _{DD} pin current	I _{DD1}	V _{DD} = 5 V, T _A = recommended conditions Control pins at high level		0.6	2.0	mA
	I _{DD2}	V _{DD} = 5 V, T _A = recommended conditions Control pins at low level		0.3	10	μA
V _M pin current	I _{M1}	Control pins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

Note Sum of ON resistances of top and bottom MOS FETs

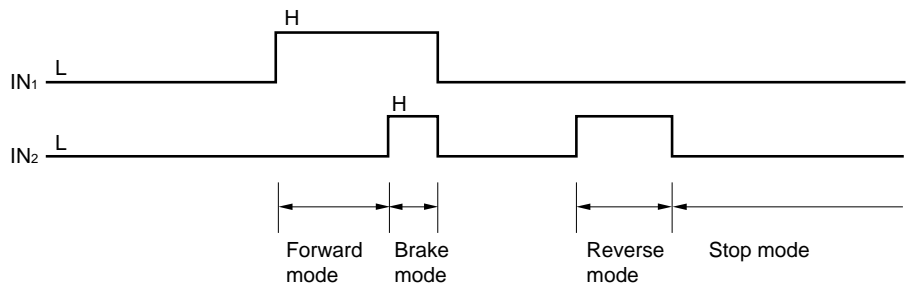
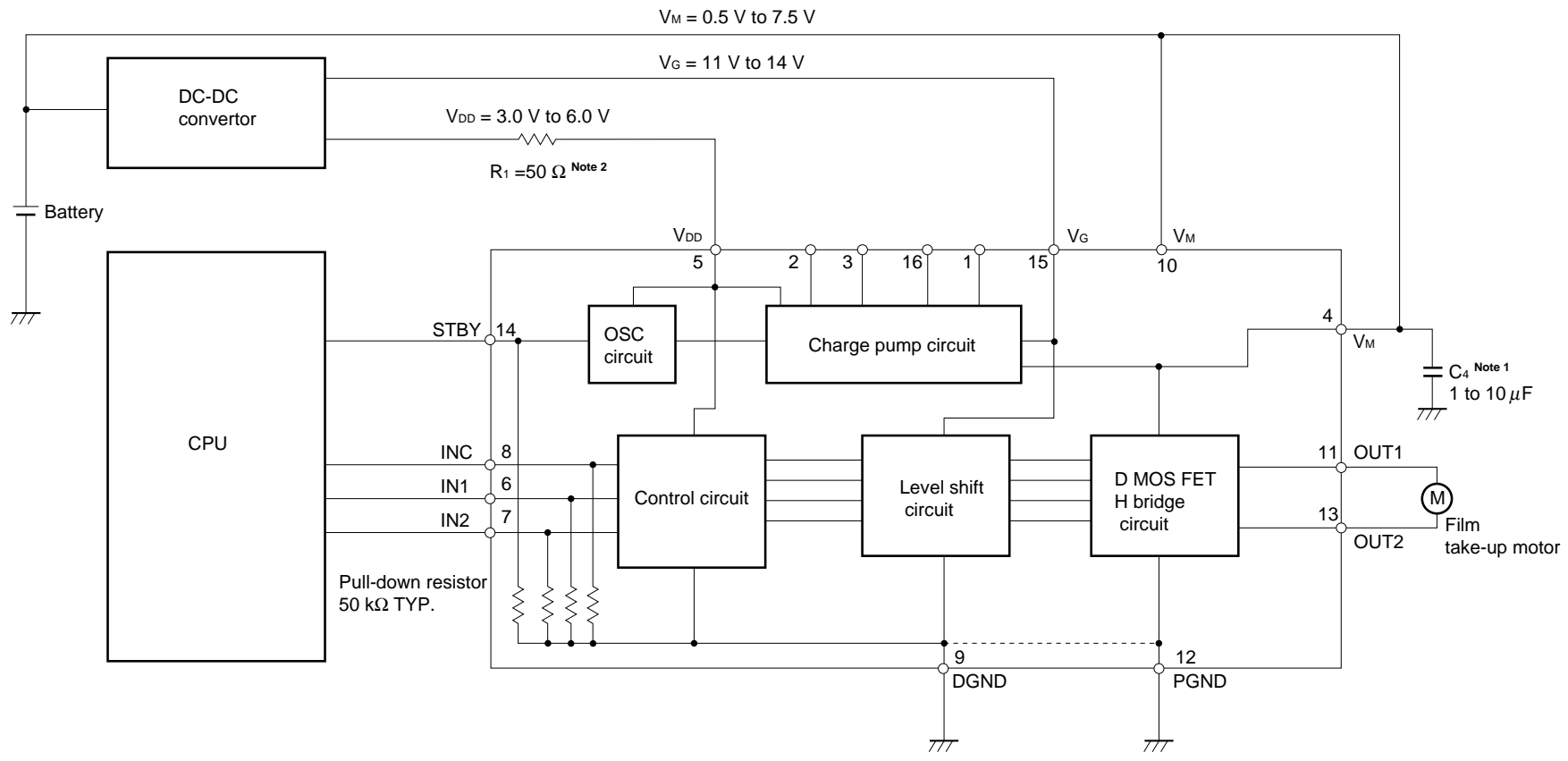
FUNCTION TABLE

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



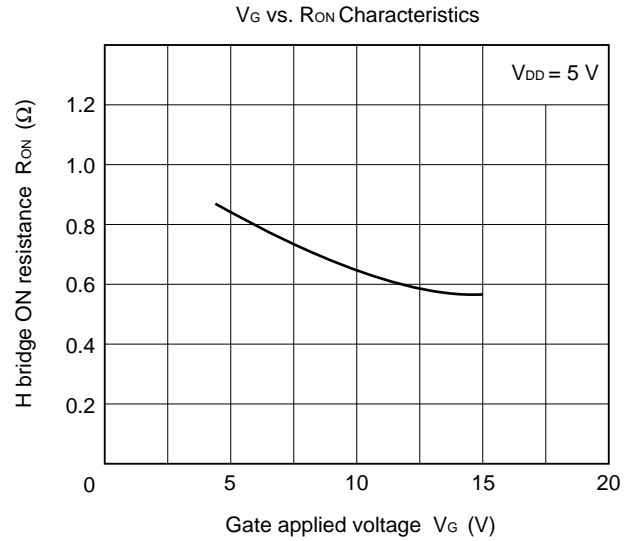
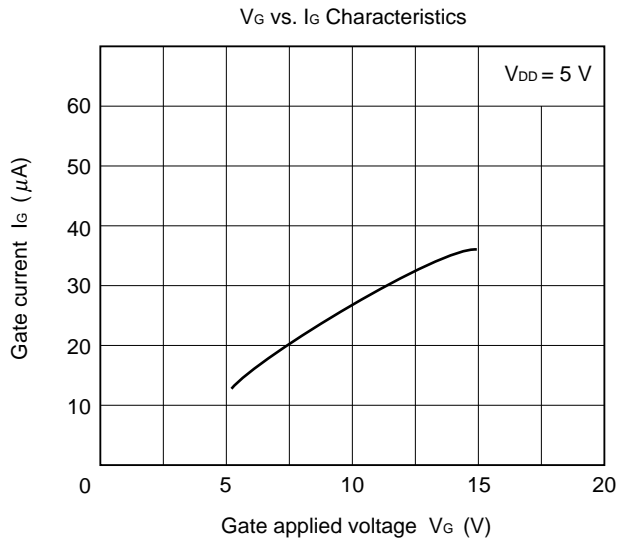
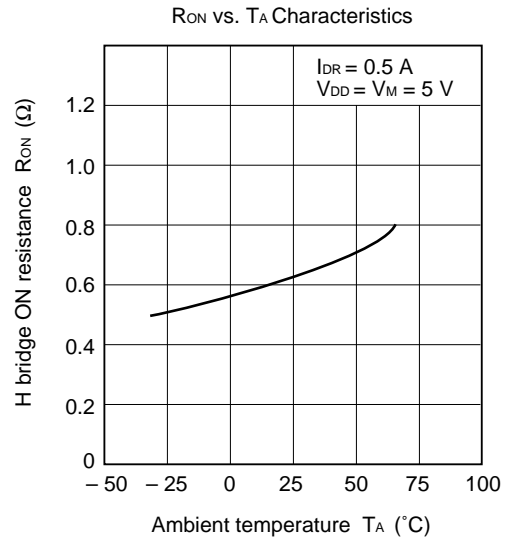
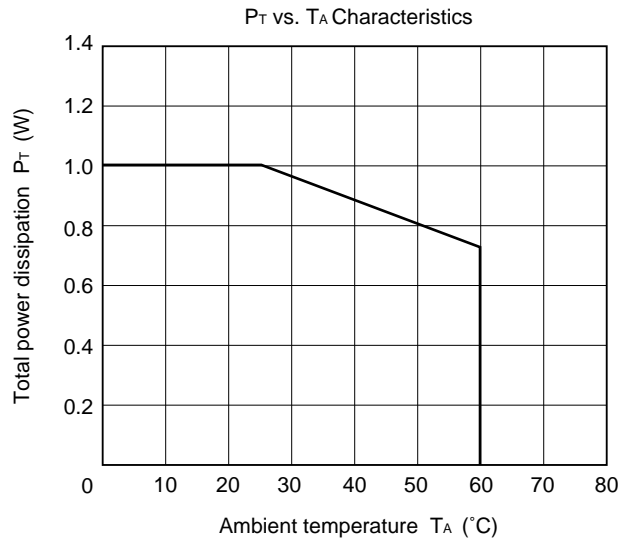


- Notes**
1. It is recommended to connect a capacitor of 1 to $10 \mu\text{F}$ between V_M and GND to protect the gate of the DMOS FET from surge voltage.
 2. Insert a resistor of $50 (\pm 10) \Omega$ to prevent malfunctioning.



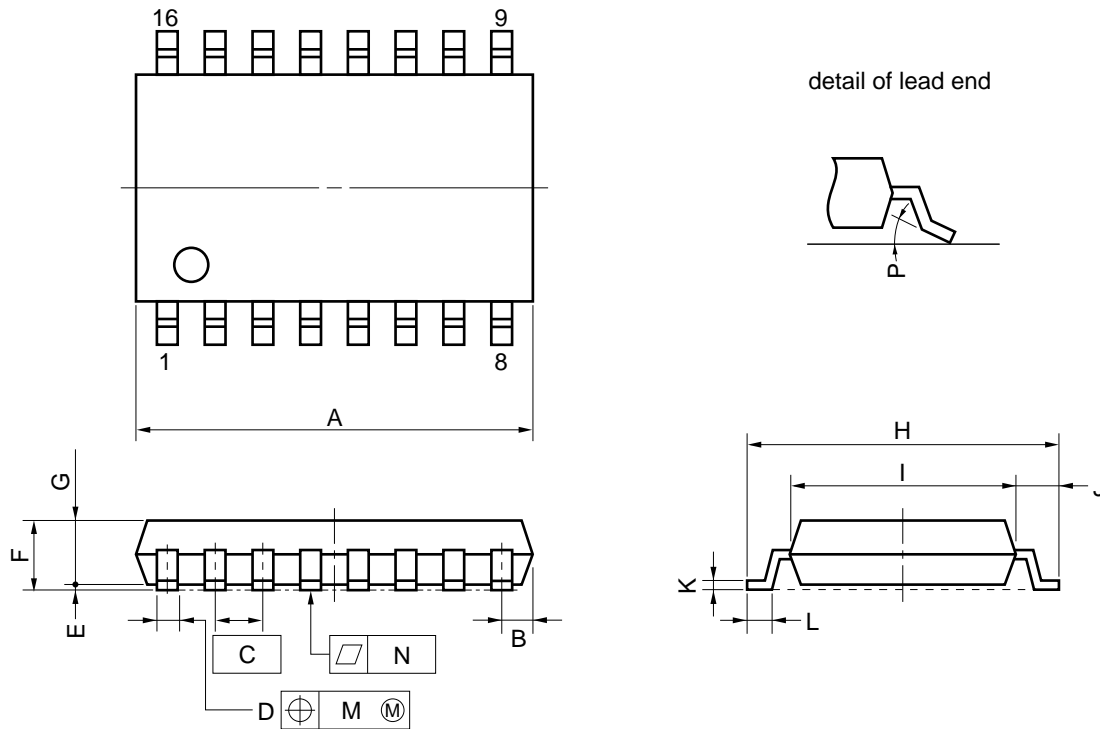
- Notes**
1. It is recommended to connect a capacitor of 1 to 10 μF between V_M and GND to protect the gate of the DMOS FET from surge voltage.
 2. Insert a resistor of 50 (± 10) Ω to prevent malfunctioning.

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 ^{+0.10} _{-0.05}	0.016 ^{+0.004} _{-0.003}
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 ^{+0.10} _{-0.05}	0.008 ^{+0.004} _{-0.002}
L	0.6±0.2	0.024 ^{+0.008} _{-0.009}
M	0.12	0.005
N	0.10	0.004
P	3° ^{+7°} _{-3°}	3° ^{+7°} _{-3°}

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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Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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Anti-radioactive design is not implemented in this product.