

MONOLITHIC H BRIDGE DRIVER**DESCRIPTION**

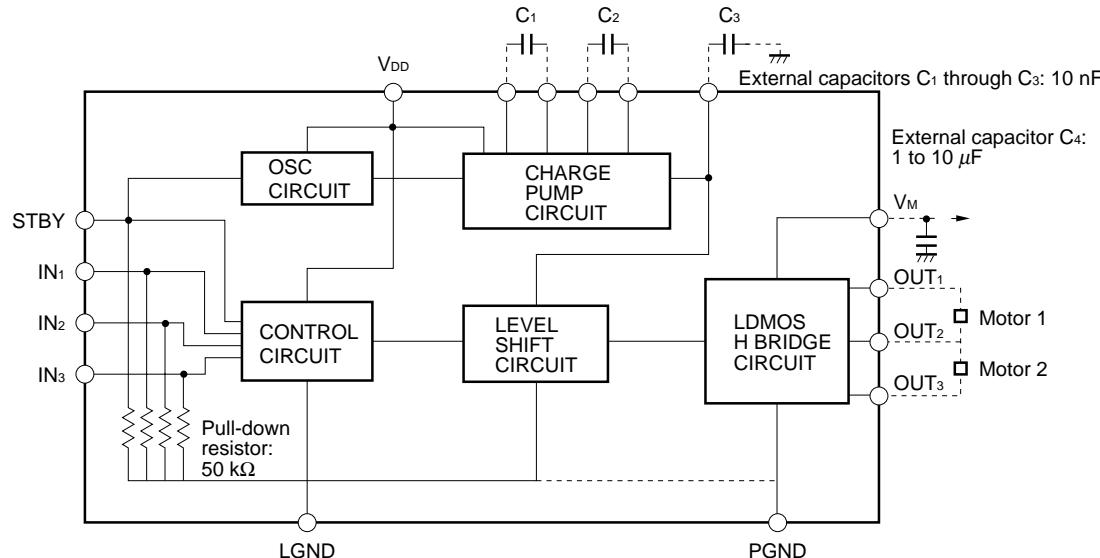
This IC is a monolithic H bridge driver employing a horizontal N-channel power MOS FET for its driver stage. It is provided with forward/reverse and brake functions and is ideal as a driver circuit for a motor that winds or rewinds the film in a camera, or a motor for moving a lens.

FEATURES

- High drive current $I_{DR1} = 0.5$ A (DC)
 $I_{DR2} = 1$ A: at $PW \leq 200$ ms, duty cycle $\leq 50\%$
 $I_{DR3} = 3$ A: at $PW \leq 200$ ms, single pulse
- 1.5ch H bridge circuits
- Low ON resistance (sum of ON resistance of top and bottom FETs)
 $R_{ON} = 0.6 \Omega$ TYP. at $I_{DR} = 0.5$ A
- Standby function that turns OFF charge pump circuit
- Low-voltage drive (2.5 V MIN.)
- Surface-mount mini-mold package: 20-pin plastic SOP (300 mil)

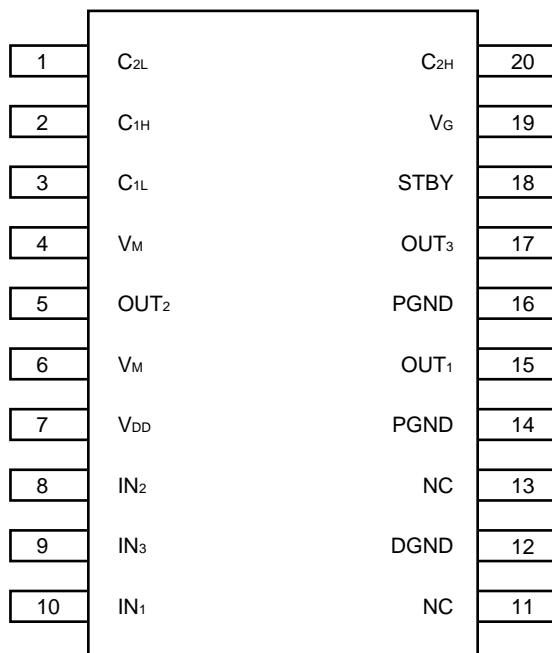
ORDERING INFORMATION

Part Number	Package
μ PD16823GS	20-pin plastic SOP (300 mil)

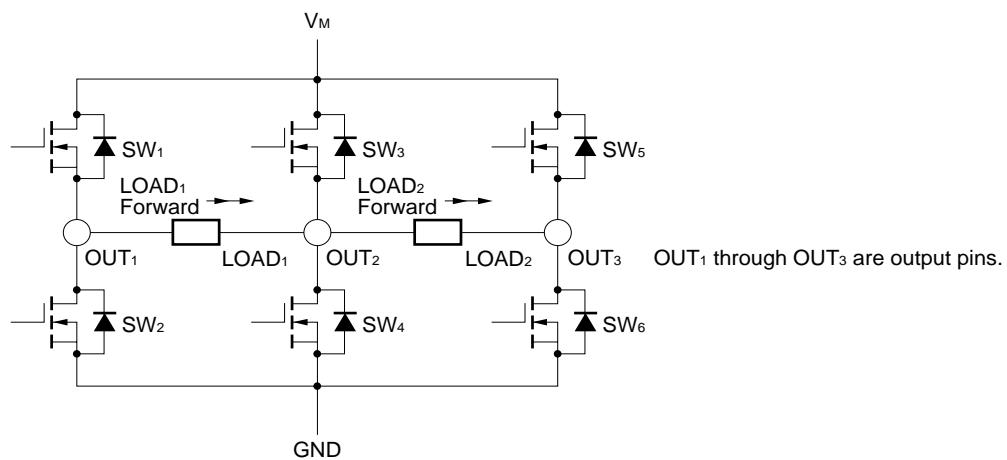
BLOCK DIAGRAM

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

PIN CONFIGURATION



INTERNAL CONNECTION



FUNCTION TABLE

Input Signal				Circuit Operation	Current Path	
IN1	IN2	IN3	STBY			
L	H	L	H	1 CH forward mode	SW ₁	→LOAD ₁ →SW ₄
L	L	H	H	1 CH reverse mode	SW ₃	→LOAD ₁ →SW ₂
L	H	H	H	1 CH brake mode	SW ₂ (Di ₂)	→LOAD ₁ →SW ₄
H	H	L	H	2 CH forward mode	SW ₃	→LOAD ₂ →SW ₆
H	L	H	H	2 CH reverse mode	SW ₅	→LOAD ₂ →SW ₄
H	H	H	H	2 CH brake mode	SW ₄ (Di ₄)	→LOAD ₂ →SW ₆
×	L	L	H	Stop mode		
×	×	×	L	Standby mode	Charge pump ON/OFF	

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

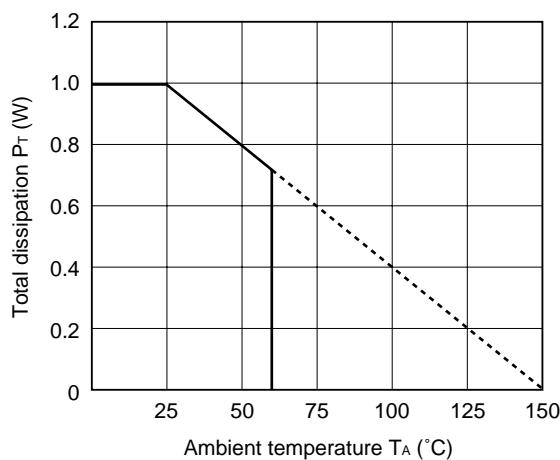
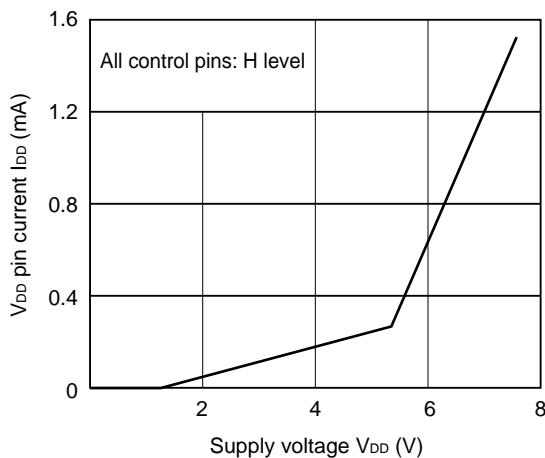
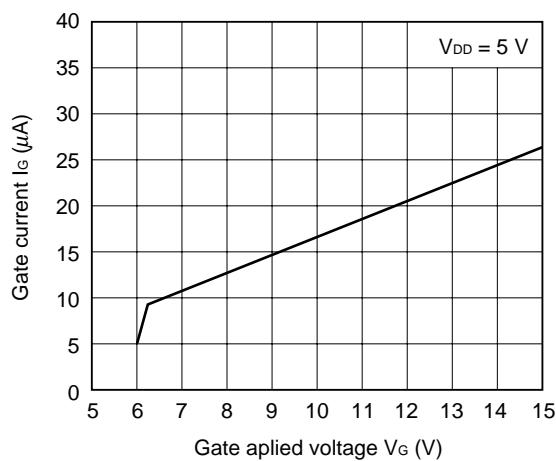
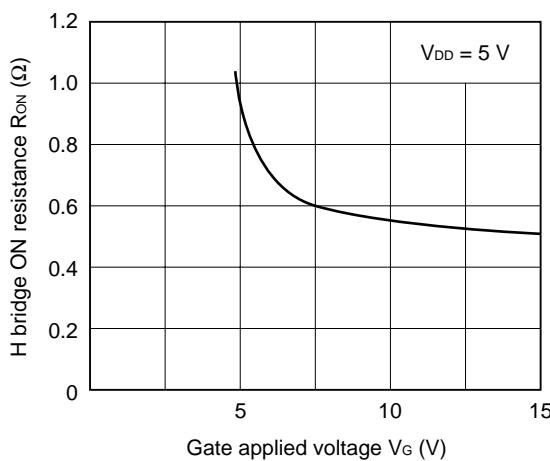
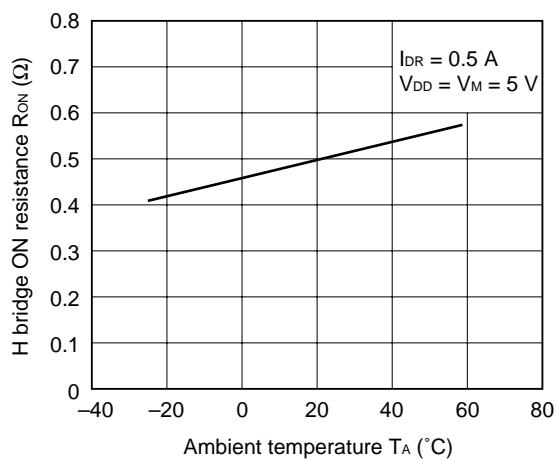
Parameter	Symbol	Condition	Ratings	Unit
(Positive) supply voltage	V _{DD}	When charge pump operates	-0.5 to +6.5	V
		When charge pump does not operate	-0.5 to +8.0	V
	V _M		-0.5 to +8.0	V
Gate drive voltage	V _G		15	V
Input voltage	V _{IN}		-0.5 to V _{DD} + 0.5	V
H bridge drive current Positive: MOS output stage forward current Negative: Output stage diode current	I _{DR}	DC	±0.5	A
		PW ≤ 200 ms, duty cycle ≤ 50%	±1.0	A
		PW ≤ 200 ms, single pulse	±3.0	A
Power dissipation	P _D		1.0	W
Operating temperature	T _A		-30 to +60	°C
Junction temperature	T _{J(peak)}		150	°C
Storage temperature	T _{stg}		-55 to +150	°C

RECOMMENDED OPERATING CONDITIONS (T_A = 25 °C)

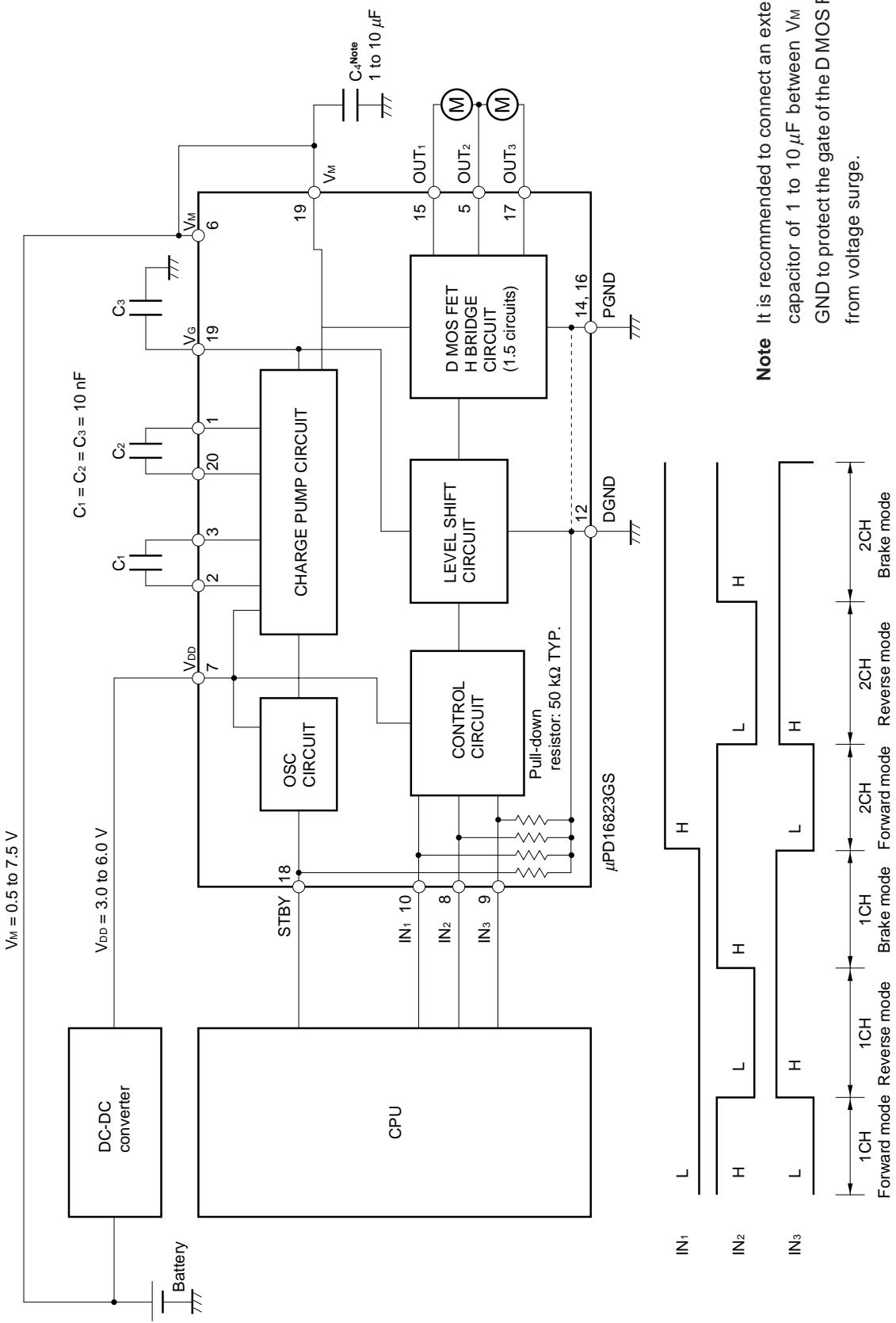
Parameter	Symbol	Condition	Ratings	Unit
(Positive) supply voltage	V _{DD}	When charge pump operates	2.5 to 6.0	V
		When charge pump does not operate	2.5 to 7.5	V
	V _M		-0.5 to +7.5	V
Gate drive voltage	V _G		11 to 14	V
Junction temperature	T _{J(peak)}		125	°C

ELECTRICAL CHARACTERISTICS (T_A = -30 °C to +60 °C)

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
V _{DD} pin current	I _{DD1}	V _{DD} = 5 V, with all control pins at high level			2.0	mA
	I _{DD2}	V _{DD} = 5 V, with all control pins at low level			10	μA
V _M pin current	I _M	T _A = 25 °C, with all control pins at low level			1.0	μA
		With all control pins at high level			10	μA
H bridge ON resistance	R _{ON}	I _{DR} = 0.5 A, V _{DD} = V _M = 5 V, T _A = 25 °C		0.6	0.8	Ω
Control pin high-level input voltage	V _{IH}		V _{DD} × 0.6			V
Control pin low-level input voltage	V _{IL}				V _{DD} × 0.2	V
Charge pump circuit turn-off time	t _{ONC}	V _{DD} = V _M = 5 V C ₁ = C ₂ = C ₂ = 10 nF I _{DR} = 0.5 A			1.0	ms
H bridge circuit turn-ON time	t _{ONH}				10	μs
H bridge circuit turn-OFF time	t _{OFFH}				5.0	μs
Regenerative diode voltage drop	V _F	I _F = 0.5 A		1.0		V
Control pin input pull-down resistance	R _{IN}		25	50	75	kΩ

TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)P_T vs. T_A CharacteristicsI_{DD} vs. V_{DD} CharacteristicsI_G vs. V_G CharacteristicsR_{ON} vs. V_G CharacteristicsR_{ON} vs. T_A Characteristics

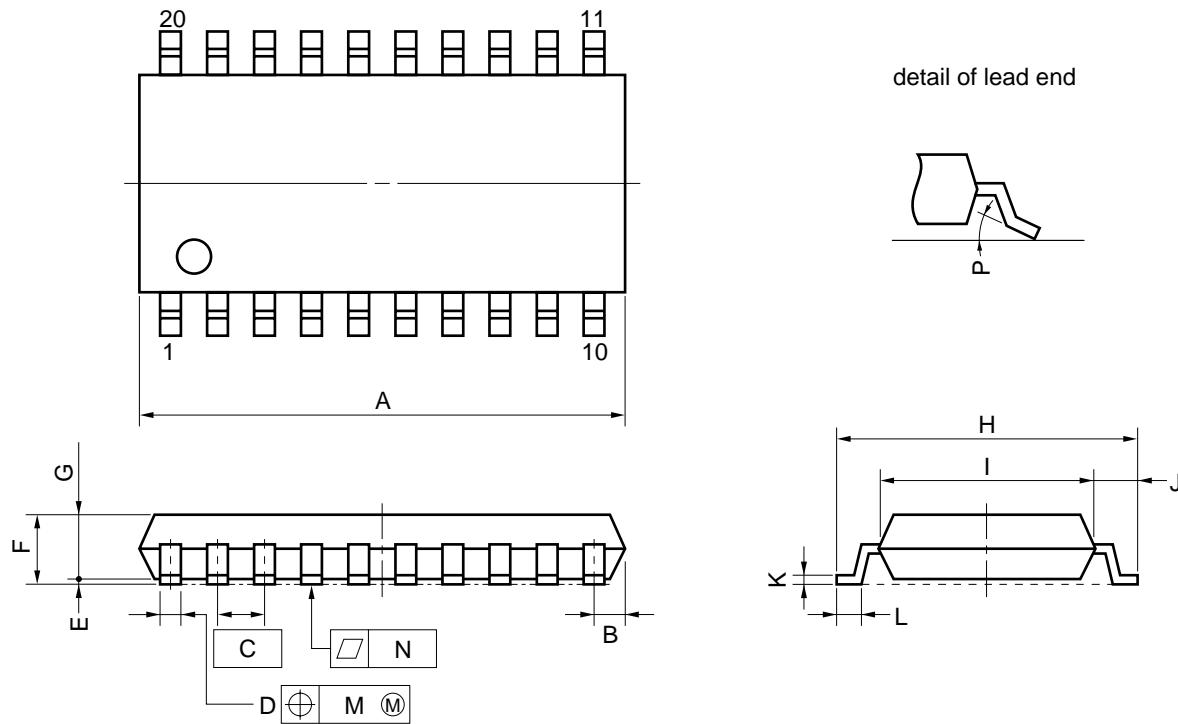
APPLICATION CIRCUIT DIAGRAM



The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

PACKAGE DIMENSION

20 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	13.00 MAX.	0.512 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	$3^{\circ} +7^{\circ}_{-3^{\circ}}$	$3^{\circ} +7^{\circ}_{-3^{\circ}}$

P20GM-50-300B, C-4

RECOMMENDED SOLDERING CONDITIONS

It is recommended to solder this product under the conditions shown below.

For soldering methods and conditions other than those listed below, consult NEC.

For details of the recommended soldering conditions, refer to Information Document “**Semiconductor Device Mounting Technology Manual**” (C10535E).

Soldering Method	Soldering Condition	Symbol of Recommended Soldering
Infrared reflow	Package peak temperature: 235 °C, Time: 30 seconds MAX. (210 °C MIN.) Number of times: 2 MAX., Number of days: None ^{Note} , Flux: Rosin-based flux with little chlorine component (chlorine: 0.2 Wt% MAX.)	IR35-00-2
VPS	Package peak temperature: 215 °C, Time: 40 seconds MAX. (200 °C MIN.) Number of times: 2 MAX., Number of days: None ^{Note} , Flux: Rosin-based flux with little chlorine component (chlorine: 0.2 Wt% MAX.)	VP15-00-2
Wave soldering	Package peak temperature: 260 °C, Time: 10 seconds MAX., Preheating temperature: 120 °C MAX., Number of times: 1, Flux: Rosin-based flux with little chlorine component (chlorine: 0.2 Wt% MAX.)	WS60-00-1

Note The number of days during which the product can be stored at 25 °C 65% RH MAX. after the dry pack was opened.

Caution Do not use two or more soldering methods in combination.

REFERENCE DOCUMENTS

Document Name	Document No.
NEC Semiconductor Device Reliability/Quality Control System	C11745E
Guide to Quality Assurance for Semiconductor Devices	MEI-1202
Safe Operating Area of Power MOS FET	TEA-1037

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Anti-radioactive design is not implemented in this product.