

To our customers,

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## Old Company Name in Catalogs and Other Documents

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

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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

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**FLASH MEMORY VOLTAGE STEPUP DC/DC CONVERTER IC**

The μPD16901 is a DC/DC converter IC which produces a 12 V output from a 5 V input source. The integration of a control circuit and power MOSFET in the output stage on a single-chip allows a power supply for flash memory write and erasure to be configured with a reduced number of external components.

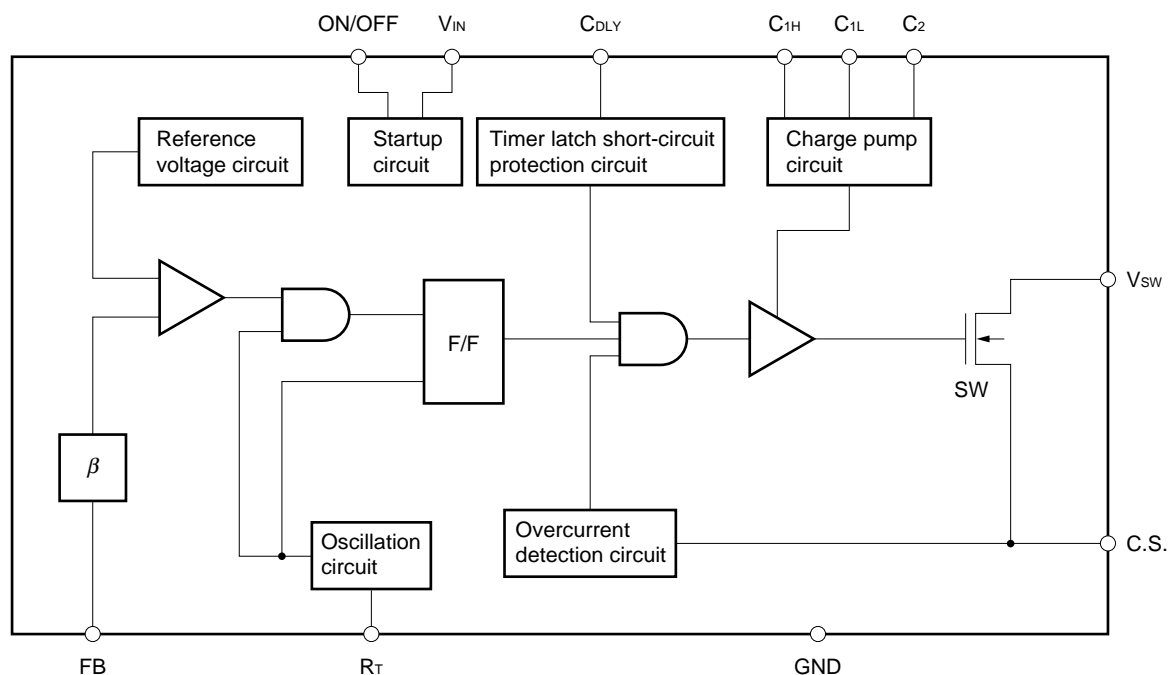
**FEATURES**

- With an on-chip output stage power MOSFET, fewer external components are needed.
- The ALLMOS structure achieves low power consumption.
- Internally set output voltage eliminates the need for adjustment.
- Output can be turned ON/OFF via an external signal.
- A timer latch type overcurrent protection circuit on chip

**ORDERING INFORMATION**

Part Number	Package
μPD16901GS	14-pin plastic SOP (300 mil)

**BLOCK DIAGRAM**



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

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C unless specified otherwise)**

Item	Symbol	Condition	Rating	Unit
Supply voltage	V <sub>IN</sub>		7.0	V
Output voltage	V <sub>SW</sub>		20	V
Total power dissipation	P <sub>T</sub>	<b>Note</b>	0.9	W
Operating ambient temperature	T <sub>A</sub>		-20 to 85	°C
Storage temperature range	T <sub>stg</sub>		-55 to +150	°C

**Note** When 90 mm × 90 mm × 1.6 mm thick glass epoxy board is mounted

**RECOMMENDED OPERATING RANGE**

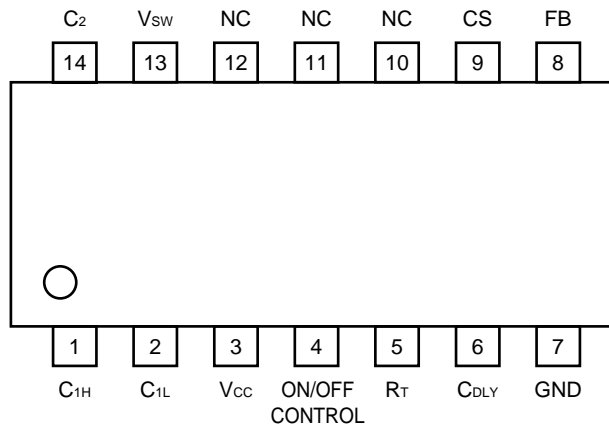
Item	Symbol	MIN.	TYP.	MAX.	Unit
Supply voltage	V <sub>DD</sub>	4.5	5.0	5.5	V
Charge pump capacitor	C1, C2	0.033	0.1	0.47	μF
Operating ambient temperature	T <sub>A</sub>	0		70	°C

**ELECTRICAL SPECIFICATIONS (T<sub>A</sub> = 25 °C, V<sub>IN</sub> = 5 V unless specified otherwise)**

Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit
(Oscillation block)						
Oscillation frequency	f <sub>osc</sub>	R <sub>T</sub> = 68 kΩ	153	167	181	kHz
On duty	DUTY			67		%
(Low voltage misoperation preventive circuit)						
Operation start voltage	V <sub>IN(start-up)</sub>		3.3	3.7	4.3	V
Operation stop voltage	V <sub>IN(stop)</sub>		2.7	3.2	3.8	V
Hysteresis width	V <sub>HYS</sub>		0.3	0.5	0.7	V
(Overcurrent detection block)						
Overcurrent detection voltage	V <sub>DET</sub>		270	300	330	mV
(On/off control block)						
ON/OFF pin input voltage	V <sub>IH</sub>	4.5 V ≤ V <sub>IN</sub> ≤ 5.5 V	V <sub>IN</sub> *0.7			V
	V <sub>IL</sub>	4.5 V ≤ V <sub>IN</sub> ≤ 5.5 V			V <sub>IN</sub> *0.3	V
ON/OFF pin input current	I <sub>IL</sub>	ON/OFF pin voltage = 0	-20	-5	-1	μA
(Charge pump circuit)						
Output voltage	V <sub>CHG</sub>	4.5 V ≤ V <sub>IN</sub> ≤ 5.5 V 0 °C ≤ T <sub>A</sub> ≤ 70 °C	8.0		11	V
(Short-circuit protection circuit)						
Timer latch pin output current	I <sub>SCP</sub>	R <sub>T</sub> = 68 kΩ	2.0	3.3	4.5	μA
Timer latch detection voltage	V <sub>DETT</sub>		0.85	1.0	1.15	V
(Output block)						
Output stage on resistance	R <sub>DS(ON)</sub>	I <sub>PK</sub> = 0.5 A		0.3	0.5	Ω
Output stage leakage current	I <sub>DSOFF</sub>	V <sub>DS</sub> = 20 V			1.0	μA

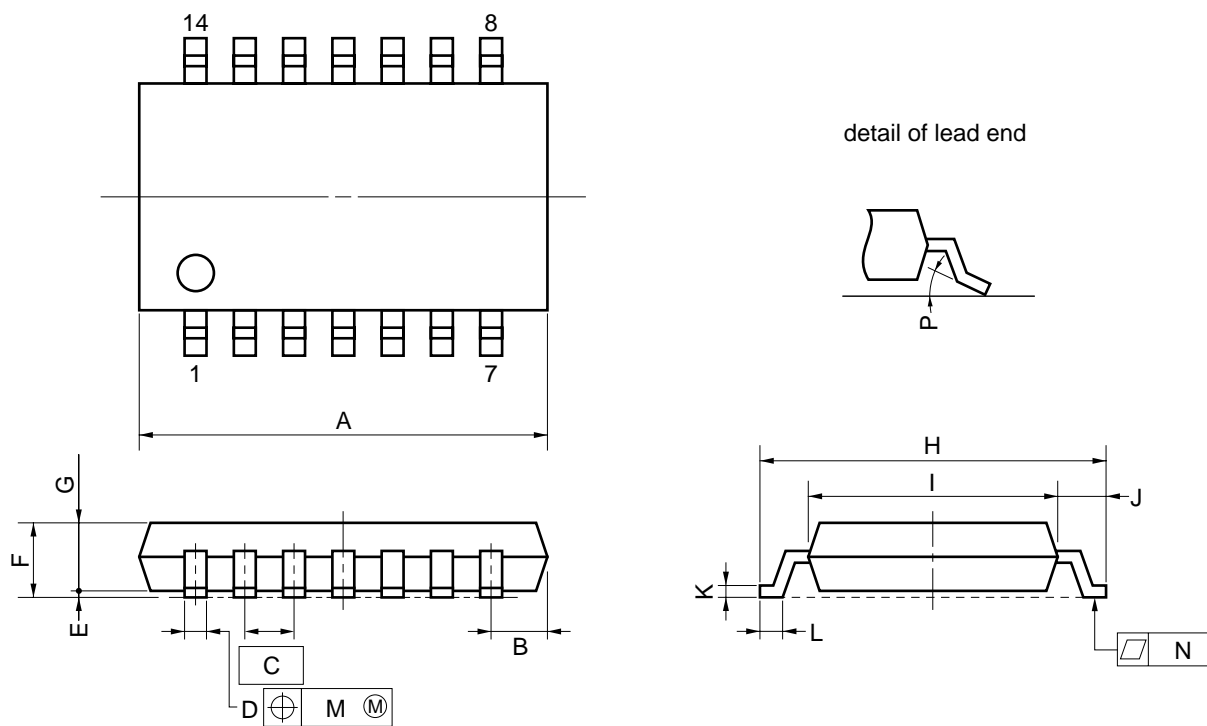
**Phase-out/Discontinued**

PIN CONFIGURATION (Top View)



PACKAGE DRAWINGS

14 PIN PLASTIC SOP (300 mil)



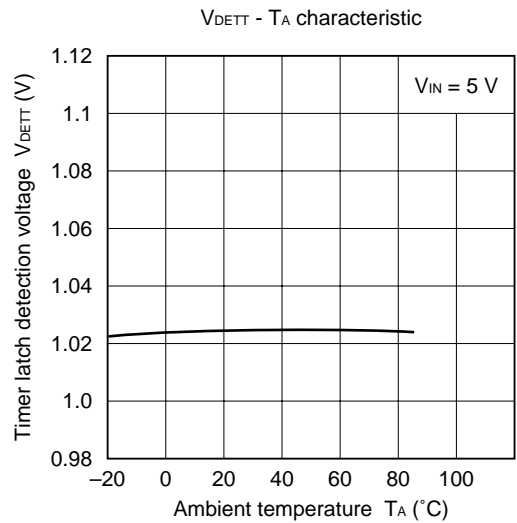
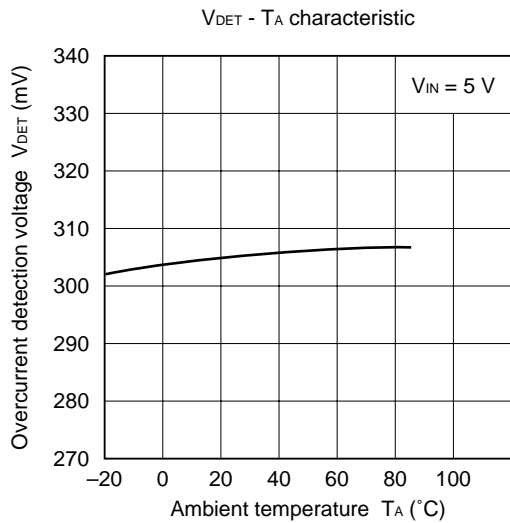
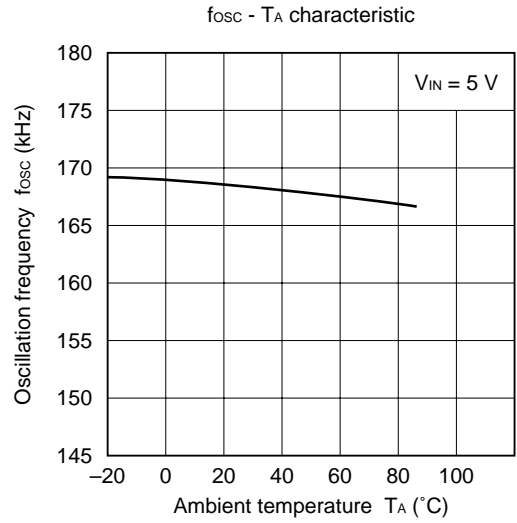
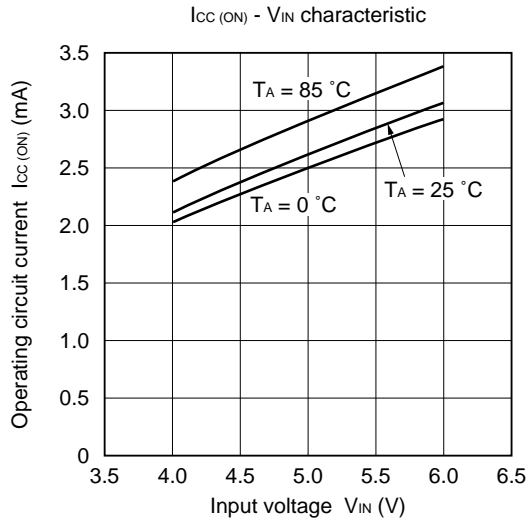
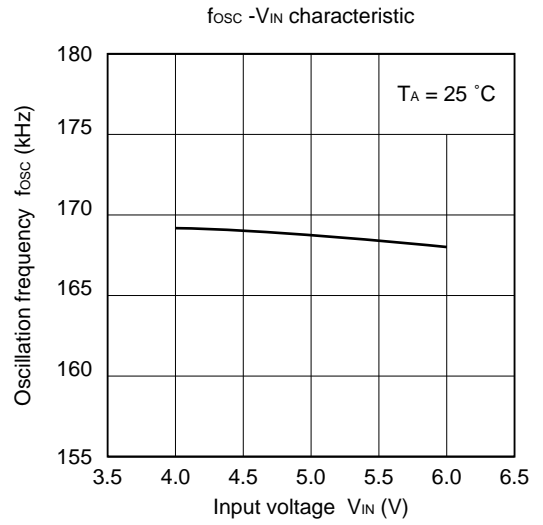
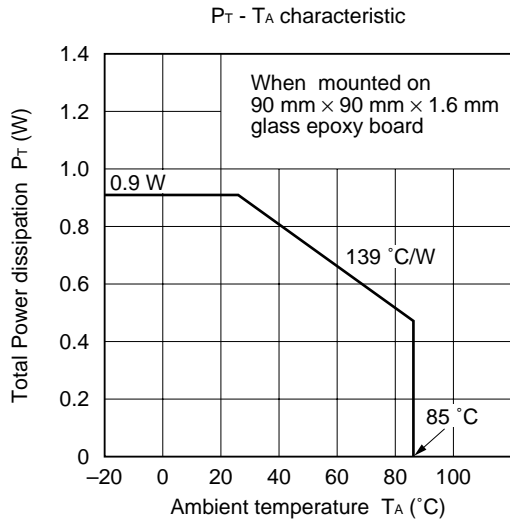
**NOTE**

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

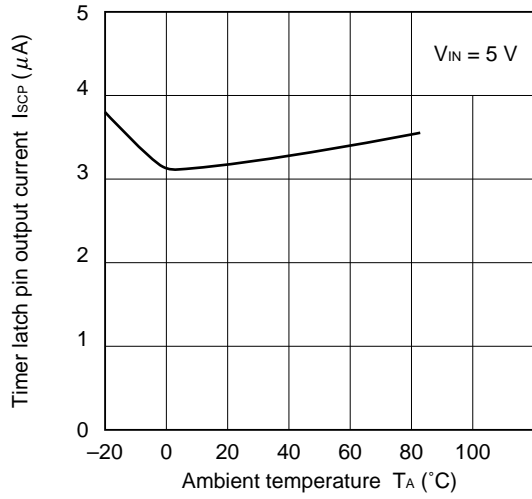
ITEM	MILLIMETERS	INCHES
A	10.46 MAX.	0.412 MAX.
B	1.42 MAX.	0.056 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40 <sup>+0.10</sup> <sub>-0.05</sub>	0.016 <sup>+0.004</sup> <sub>-0.003</sub>
E	0.1±0.1	0.004±0.004
F	1.8 MAX.	0.071 MAX.
G	1.55	0.061
H	7.7±0.3	0.303±0.012
I	5.6	0.220
J	1.1	0.043
K	0.20 <sup>+0.10</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>

P14GM-50-300B-4

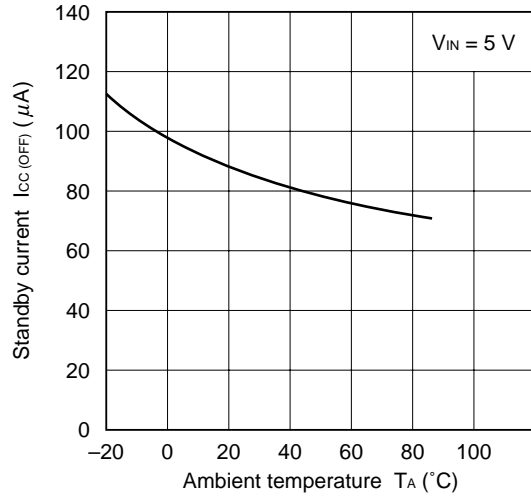
STANDARD CHARACTERISTIC CURVES



I<sub>SCP</sub> - T<sub>A</sub> characteristic

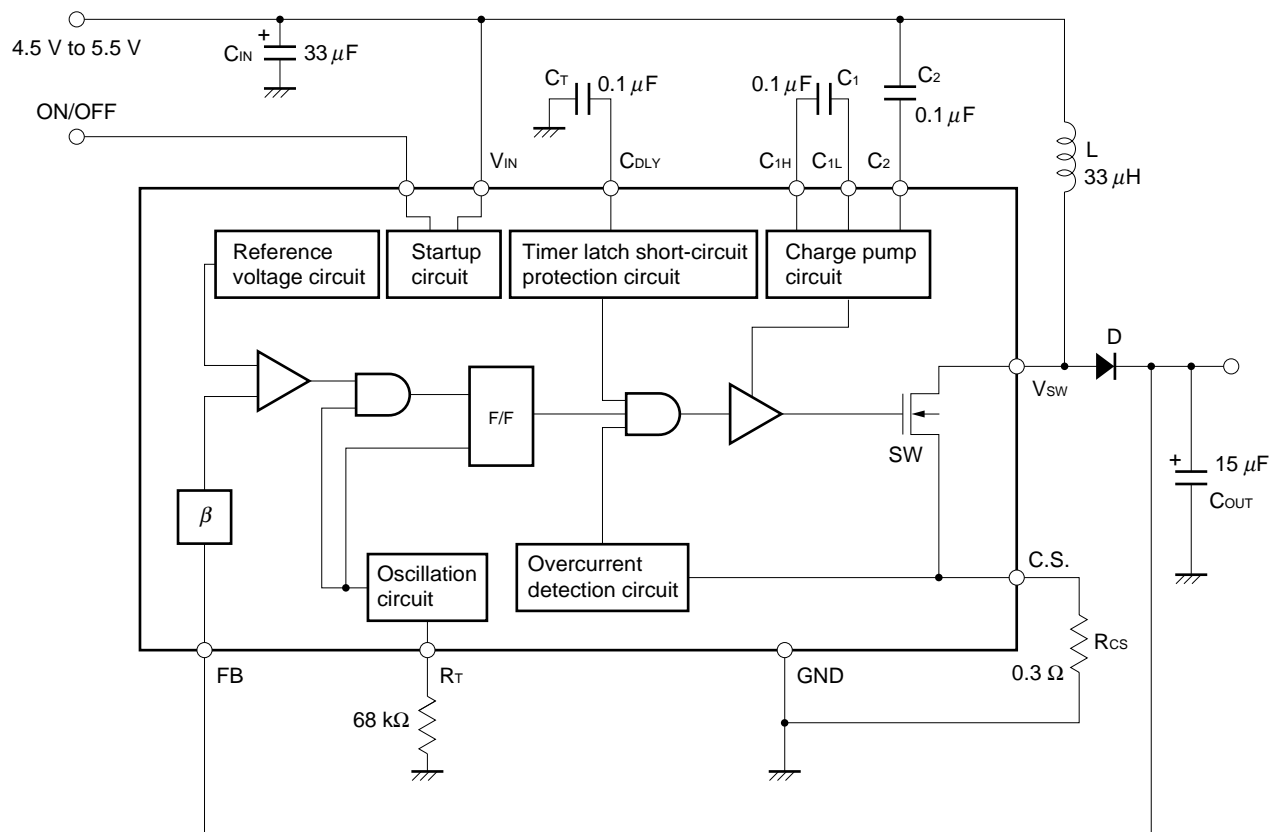


I<sub>CC(OFF)</sub> - T<sub>A</sub> characteristic





**STANDARD CONNECTION DIAGRAM**



**Remark** The circuit constants and circuit configuration in this connection diagram are shown for illustrative purposes and not intended for volume production design.

**ELECTRICAL SPECIFICATIONS**

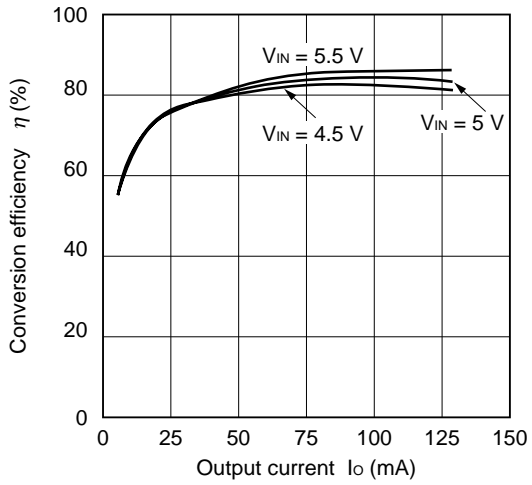
(as per standard connection diagram.  $T_A = 25\text{ }^\circ\text{C}$ ,  $V_{IN} = 5\text{ V}$ ,  $I_{OUT} = 140\text{ mA}$  unless specified otherwise)

Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Output voltage	$V_{OUT}$	$4.5\text{ V} \leq V_{IN} \leq 5.5\text{ V}$ $0\text{ mA} \leq I_o \leq 140\text{ mA}$ $0\text{ }^\circ\text{C} \leq T_A \leq 60\text{ }^\circ\text{C}$	11.52	12.00	12.48	V
Input stability	$REG_{IN}$	$4.5\text{ V} \leq V_{IN} < 5.5\text{ V}$		0.5		%/V
Load stability	$REG_L$	$0\text{ mA} \leq I_o < 140\text{ mA}$		0.004		%/mA
Conversion efficiency	$\eta$			83		%
Operating circuit current	$I_{CC}$	$I_o = 0$			3.0	mA
Standby circuit current	$I_{CC(OFF)}$	ON/OFF pin voltage = 0			100	μA
Startup voltage	$V_{IN(start-up)}$			3.7	4.3	V

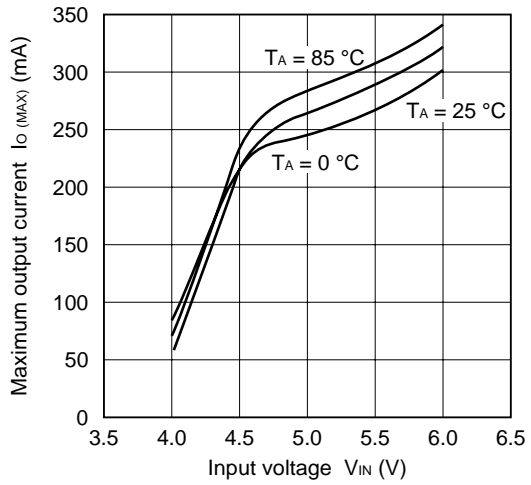
**Remark** These specifications are reference values confirmed with the standard connection diagram (without taking account of variations) and are not intended to guarantee the characteristics of the product as a DC/DC converter.

STANDARD CHARACTERISTIC CURVES (as per standard connection diagram)

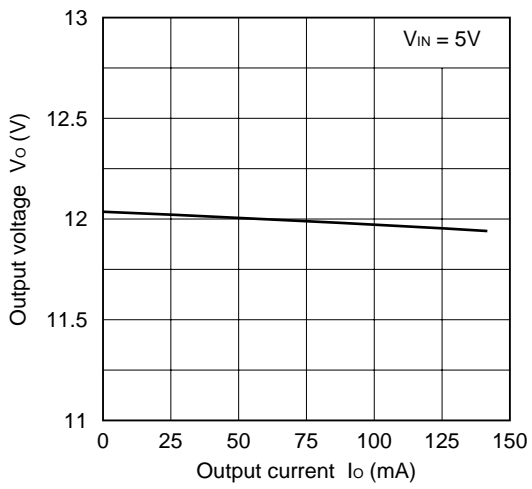
$\eta$  -  $I_o$  characteristic



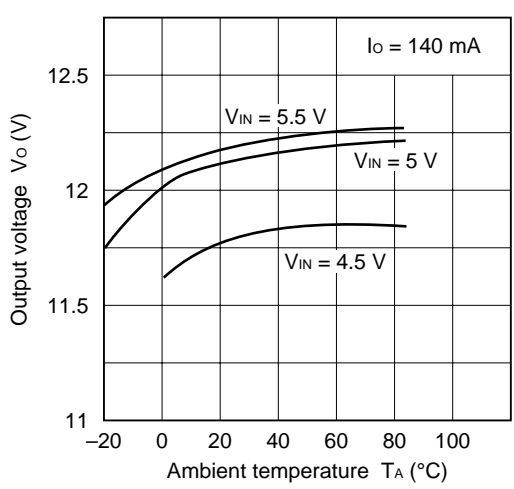
$I_o(\text{MAX})$  -  $V_{IN}$  characteristic



$V_o$  -  $I_o$  characteristic



$V_o$  -  $T_A$  characteristic



**RECOMMENDED SOLDERING CONDITIONS**

This product should be soldered and mounted under the conditions recommended below.

For soldering methods and conditions other than those recommended, please contact your NEC sales representative.

For details of recommended soldering conditions, refer to the information document "**Semiconductor Device Mounting Technology Manual.**"

Soldering Method	Soldering Conditions	Recommended Condition Symbol
Infrared reflow	Package peak temperature: 235 °C; Duration: 30 sec. max. (210 °C or above): Number of times: Max. 3; Time limit: None <sup>Note</sup> Flux: Rosin type flux with reduced chlorine content (chlorine 0.2 Wt% or less) is recommended.	IR35-00-3
VPS	Package peak temperature: 215 °C; Duration: 40 sec. max. (200 °C or above): Number of times: 1; Time limit: None <sup>Note</sup> Flux: Rosin type flux with reduced chlorine content (chlorine 0.2 Wt% or less) is recommended.	VP15-00-1
Wave soldering	Package peak temperature: 260 °C or less, Duration: 10 sec. max., Preparatory heating temperature: 120 °C or less; Number of times: 1 Flux: Rosin type flux with reduced chlorine content (chlorine 0.2 Wt% or less) is recommended.	WS60-00-1

**Note** For the storage period after unpacking from the dry-pack, storage conditions are max. 25 °C, 65% RH.

**Caution** Use of more than one soldering method should be avoided.

**REFERENCE DOCUMENTS**

NEC Semiconductor Device Reliability/Quality Control System	10983E
Semiconductor Device Quality Guarantee Guide	MEI-1202
Semiconductor Device Mounting Technology Manual	C10535E

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[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.