

FLASH MEMORY VOLTAGE STEPUP DC/DC CONVERTER IC

The μ PD16901 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.

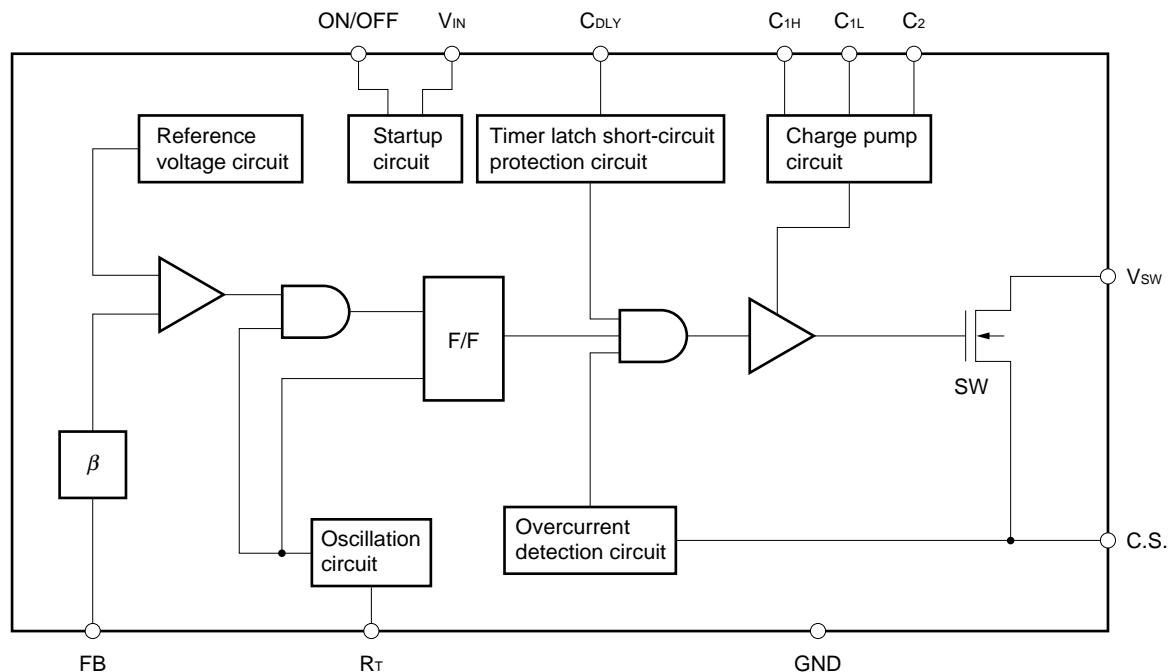
FEATURES

- 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 |
|-----------------|------------------------------|
| μ PD16901GS | 14-pin plastic SOP (300 mil) |

BLOCK DIAGRAM



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

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C unless specified otherwise)

| Item | Symbol | Condition | Rating | Unit |
|-------------------------------|------------------|-------------|-------------|------|
| Supply voltage | V _{IN} | | 7.0 | V |
| Output voltage | V _{SW} | | 20 | V |
| Total power dissipation | P _T | Note | 0.9 | W |
| Operating ambient temperature | T _A | | -20 to 85 | °C |
| Storage temperature range | T _{stg} | | -55 to +150 | °C |

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

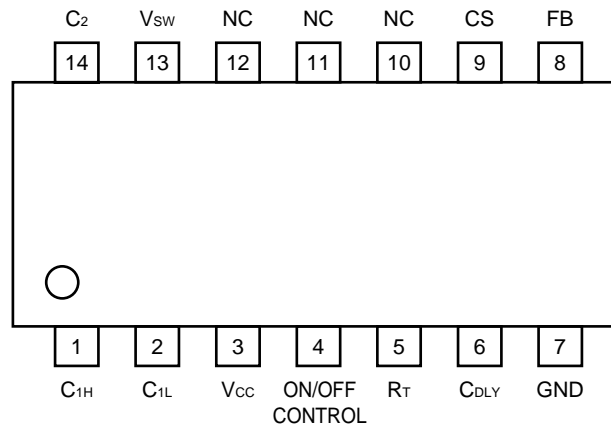
RECOMMENDED OPERATING RANGE

| Item | Symbol | MIN. | TYP. | MAX. | Unit |
|-------------------------------|-----------------|-------|------|------|------|
| Supply voltage | V _{DD} | 4.5 | 5.0 | 5.5 | V |
| Charge pump capacitor | C1, C2 | 0.033 | 0.1 | 0.47 | μF |
| Operating ambient temperature | T _A | 0 | | 70 | °C |

ELECTRICAL SPECIFICATIONS (T_A = 25 °C, V_{IN} = 5 V unless specified otherwise)

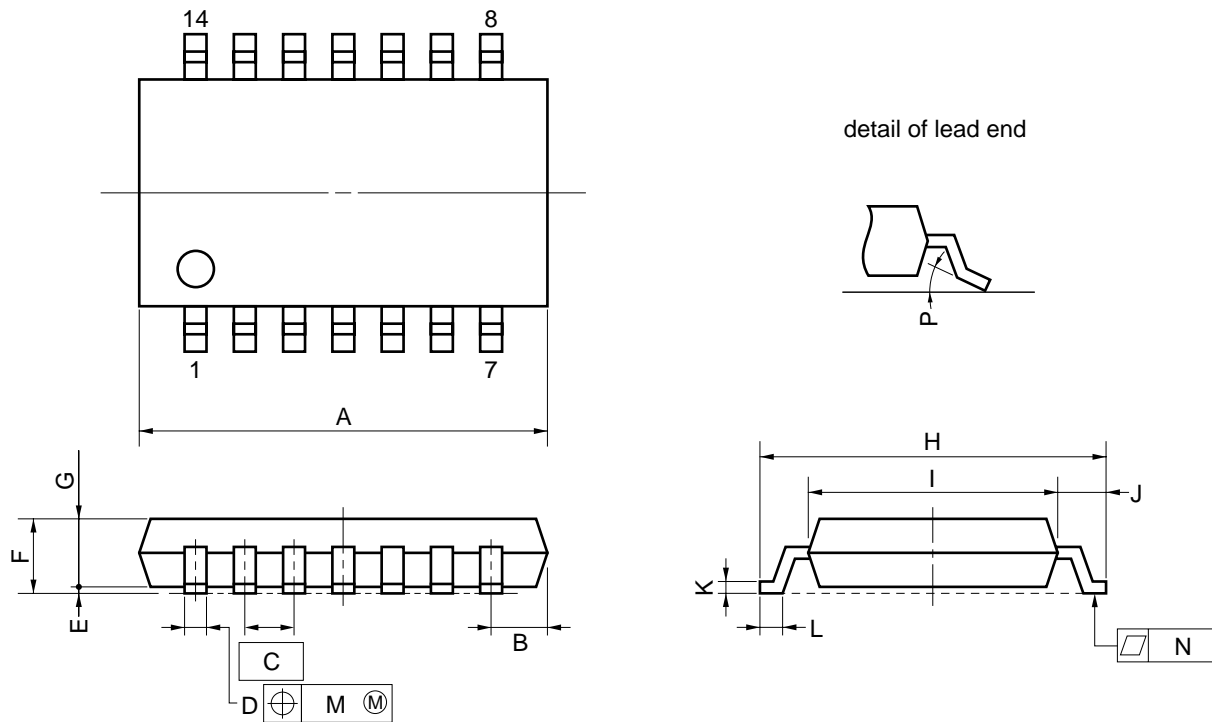
| Item | Symbol | Condition | MIN. | TYP. | MAX. | Unit |
|---|---------------------------|--|----------------------|------|----------------------|------|
| (Oscillation block) | | | | | | |
| Oscillation frequency | f _{OSC} | R _T = 68 kΩ | 153 | 167 | 181 | kHz |
| On duty | DUTY | | | 67 | | % |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

PIN CONFIGURATION (Top View)



PACKAGE DRAWINGS

14 PIN PLASTIC SOP (300 mil)



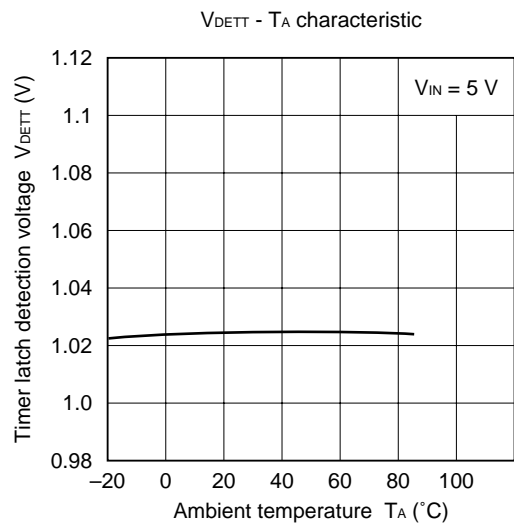
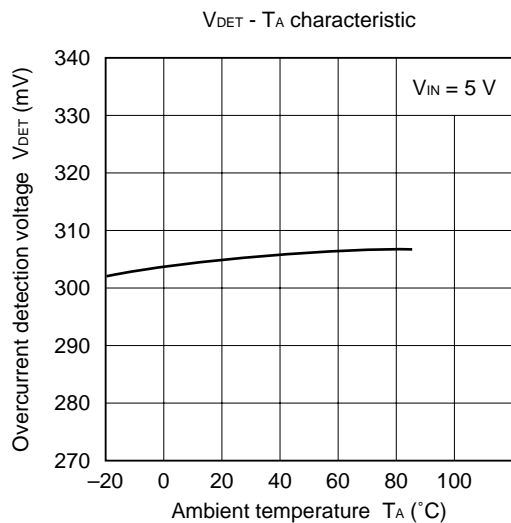
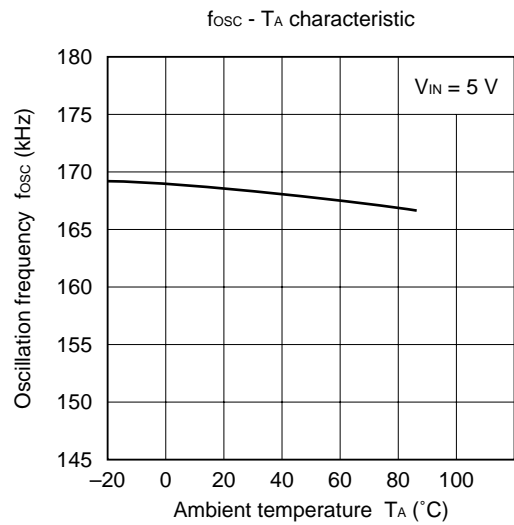
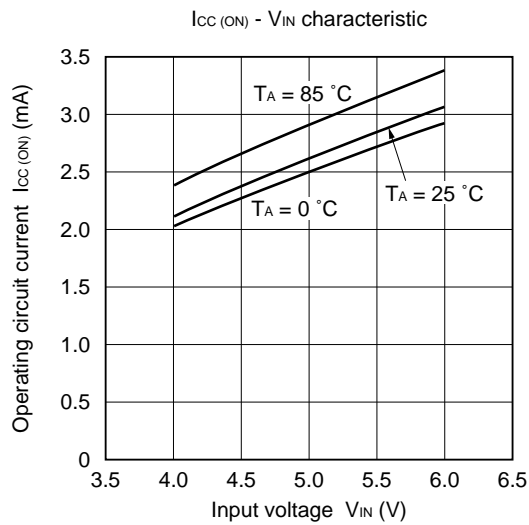
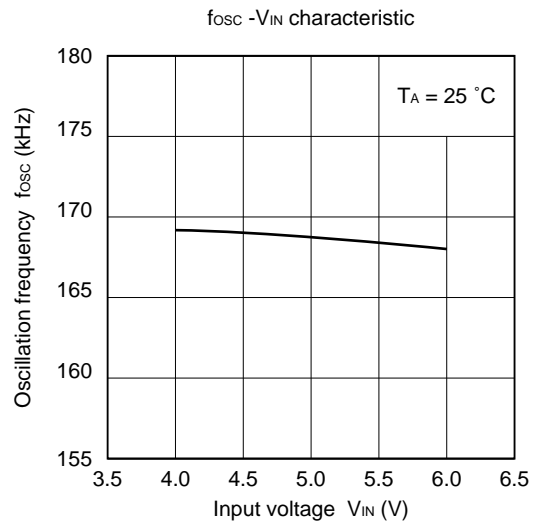
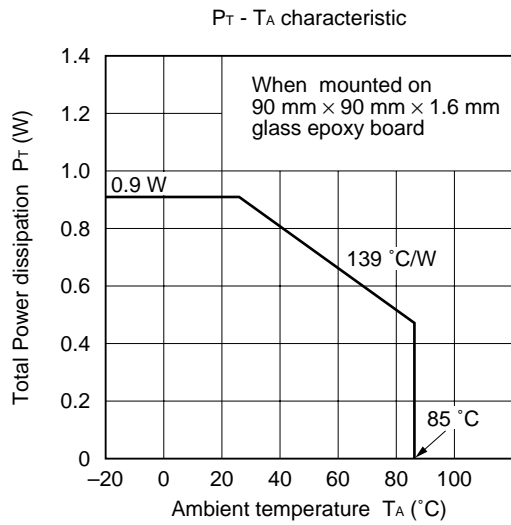
NOTE

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

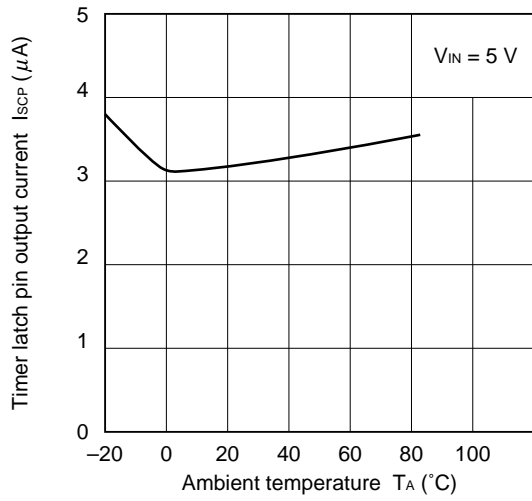
| ITEM | MILLIMETERS | INCHES |
|------|--|---|
| A | 10.46 MAX. | 0.412 MAX. |
| B | 1.42 MAX. | 0.056 MAX. |
| C | 1.27 (T.P.) | 0.050 (T.P.) |
| D | 0.40 ^{+0.10} _{-0.05} | 0.016 ^{+0.004} _{-0.003} |
| E | 0.1±0.1 | 0.004±0.004 |
| F | 1.8 MAX. | 0.071 MAX. |
| G | 1.55 | 0.061 |
| H | 7.7±0.3 | 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°} |

P14GM-50-300B-4

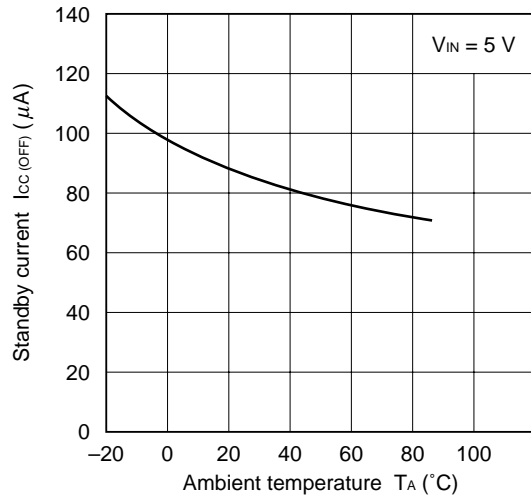
STANDARD CHARACTERISTIC CURVES



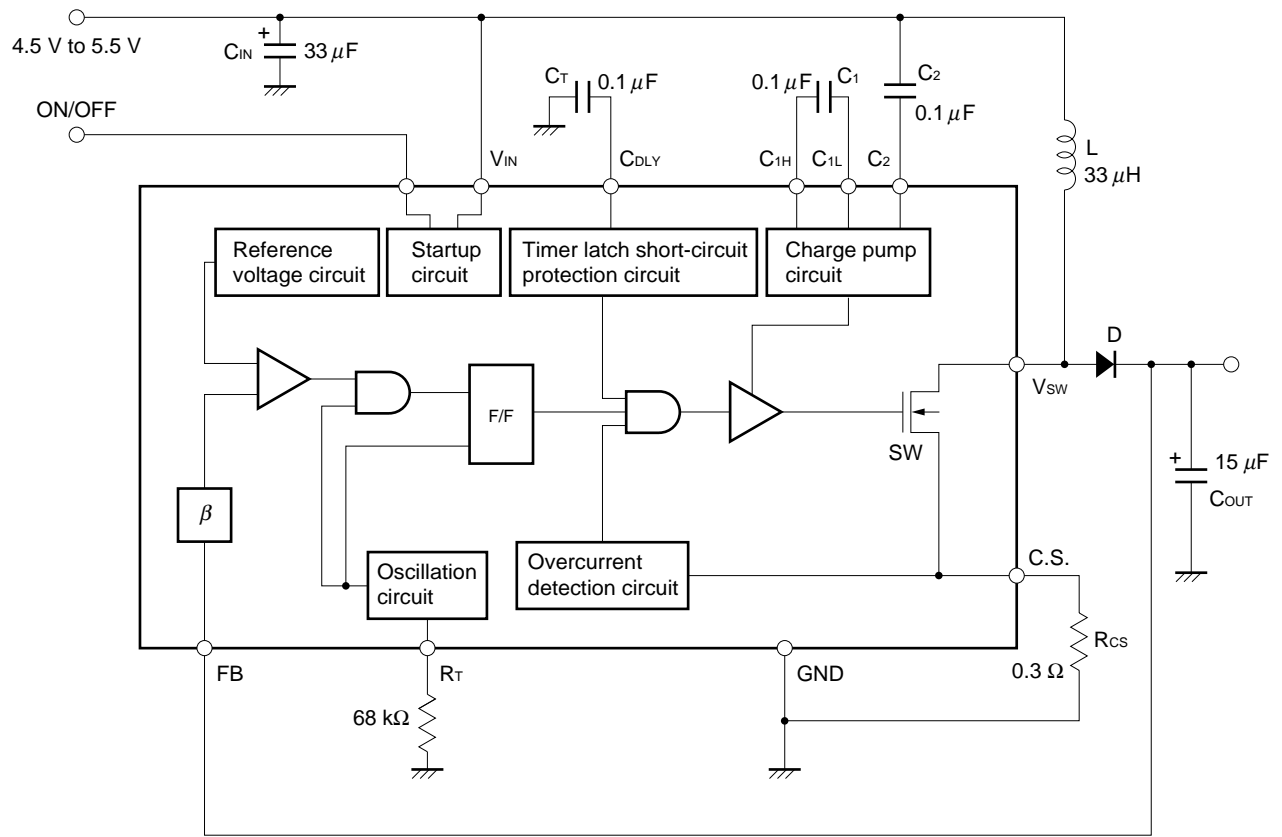
I_{SCP} - T_A characteristic



I_{CC(OFF)} - T_A 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

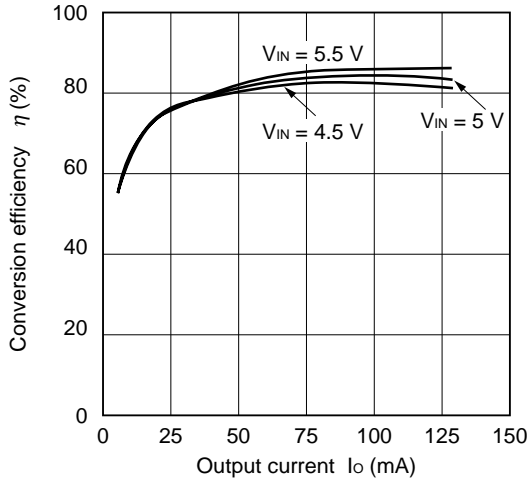
(as per standard connection diagram. $T_A = 25\text{ }^\circ\text{C}$, $V_{IN} = 5\text{ V}$, $I_{OUT} = 140\text{ mA}$ unless specified otherwise)

| 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 | η | | | 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 |

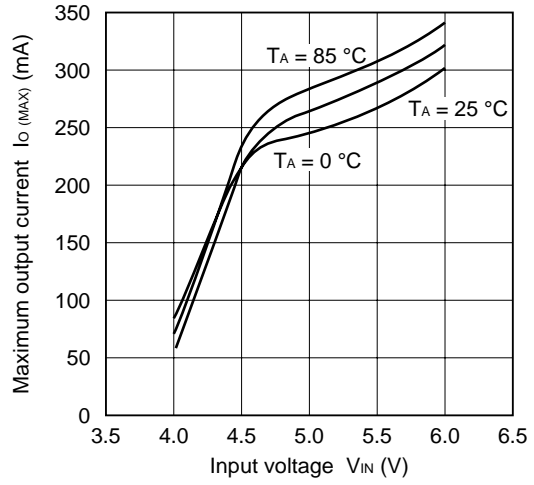
Remark These specifications are reference values confirmed with the standard connection diagram (without taking account of variations) and are not intended to guarantee the characteristics of the product as a DC/DC converter.

STANDARD CHARACTERISTIC CURVES (as per standard connection diagram)

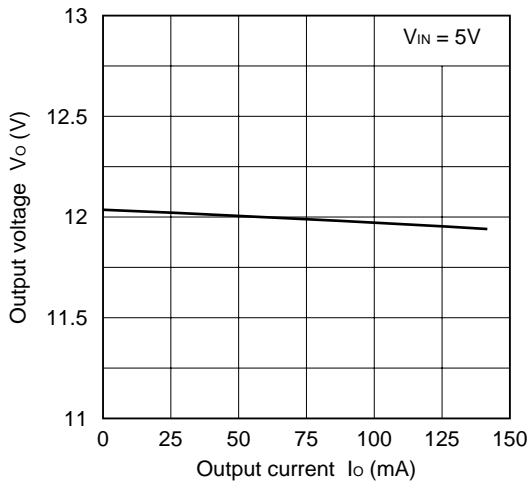
η - I_o characteristic



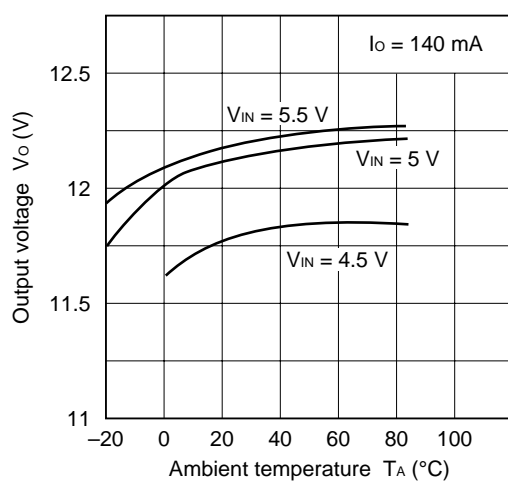
I_o (MAX) - V_{IN} characteristic



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 ^{Note} 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 ^{Note} 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 |

[MEMO]

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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.