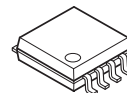


## HIGH PRECISION DC/DC CONVERTER CONTROL IC

### ■GENERAL DESCRIPTION

The **NJM2340** is a high precision DC/DC converter control IC with a current sense amplifier. It offers a low side current sensing which offers a DC/DC converter application with a few external parts and minimum error. The NJM2340 has a high input voltage and is available in small surface mount packages, an 8-lead DMP and MSOP (TVSP). Therefore it is well-suited for various applications.

### ■PACKAGE OUTLINE



**NJM2340M**  
(DMP8)



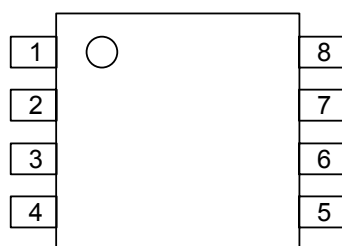
**NJM2340RB1**  
(MSOP8 (TVSP8))

### ■FEATURES

- PWM switching control
- Operating Voltage (3.6 to 32V)
- Wide Oscillator Range (20kHz to 500 kHz)
- Duty Cycle (0% to 100%)
- Current Sensing Amplifier
- High Precision Reference Voltage Voltage Detect:  $1V \pm 1.5\%$   
Current Detect:  $150mV \pm 4\%$
- Bipolar Technology
- Package Outline DMP8, MSOP8 (TVSP8)\*

\*MEET JEDEC MO-187-DA / THIN TYPE

### ■PIN CONFIGURATION



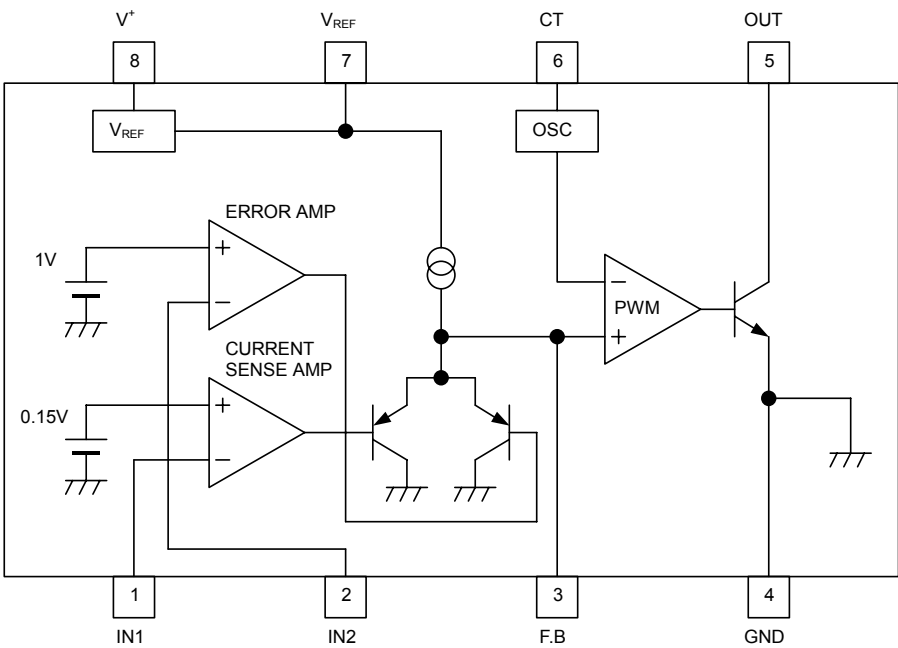
**NJM2340M**  
**NJM2340RB1**

#### Pin Function

- 1.IN1**
- 2.IN2**
- 3.F.B**
- 4.GND**
- 5.OUT**
- 6.CT**
- 7.V<sub>REF</sub>**
- 8.V<sup>+</sup>**

# NJM2340

## ■BLOCK DIAGRAM



## ■ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| PARAMETER                   | SYMBOL            | RATINGS                          | UNIT |
|-----------------------------|-------------------|----------------------------------|------|
| Maximum Supply Voltage      | V <sup>+</sup>    | 36                               | V    |
| Output Sink Current         | I <sub>SINK</sub> | 15                               | mA   |
| Power Dissipation           | P <sub>D</sub>    | (DMP8) 300<br>(MSOP8(TVSP8)) 320 | mW   |
| Operating Temperature Range | Topr              | -40 to +85                       | °C   |
| Storage Temperature Range   | Tstg              | -50 to +150                      | °C   |

## ■RECOMMENDED OPERATING CONDITIONS (Ta=25°C)

| PARAMETER                    | SYMBOL         | MIN. | MAX. | UNIT |
|------------------------------|----------------|------|------|------|
| Supply Voltage               | V <sup>+</sup> | 3.6  | 32   | V    |
| Oscillation Frequency        | fosc           | 20   | 500  | kHz  |
| Oscillator Timing Resistance | R <sub>T</sub> | 20   | 100  | kΩ   |

## ■ELECTRICAL CHARACTERISTICS (V<sup>+</sup>=12V, Ta=25°C)

### REFERENCE VOLTAGE BLOCK

| PARAMETER       | SYMBOL           | TEST CONDITION                                  | MIN. | TYP. | MAX. | UNIT |
|-----------------|------------------|-------------------------------------------------|------|------|------|------|
| Output Voltage  | V <sub>REF</sub> | I <sub>OR</sub> =1mA                            | 1.98 | 2.00 | 2.02 | V    |
| Line Regulation | L <sub>INE</sub> | V <sup>+</sup> =3.6 ~ 32V, I <sub>OR</sub> =1mA | –    | 4.0  | 20   | mV   |
| Load Regulation | L <sub>OAD</sub> | I <sub>OR</sub> =0.1 ~ 5.0mA                    | –    | 6.0  | 40   | mV   |

### OSCILLATOR BLOCK

| PARAMETER             | SYMBOL           | TEST CONDITION                              | MIN. | TYP. | MAX. | UNIT |
|-----------------------|------------------|---------------------------------------------|------|------|------|------|
| Oscillation Frequency | f <sub>OSC</sub> | R <sub>T</sub> =27kΩ, C <sub>T</sub> =220pF | 315  | 350  | 385  | kHz  |

### CURRENT SENSE AMPLIFIER BLOCK

| PARAMETER                            | SYMBOL            | TEST CONDITION         | MIN. | TYP.                      | MAX. | UNIT |
|--------------------------------------|-------------------|------------------------|------|---------------------------|------|------|
| Reference Voltage1                   | V <sub>B1</sub>   |                        | 144  | 150                       | 156  | mV   |
| Input Bias Voltage1                  | I <sub>B1</sub>   |                        | –    | 20                        | 100  | nA   |
| Maximum Output Voltage1<br>(F.B Pin) | V <sub>OM+1</sub> | R <sub>NF</sub> =100kΩ | –    | V <sub>REF</sub><br>-0.15 | –    | V    |
|                                      | V <sub>OM-1</sub> | R <sub>NF</sub> =100kΩ | 0.6  | 0.75                      | 0.9  | V    |
| Maximum Source Current1<br>(F.B Pin) | I <sub>OM1</sub>  | V <sub>OM1</sub> =0.5V | 40   | 85                        | 200  | μA   |

### ERROR AMPLIFIER BLOCK

| PARAMETER                            | SYMBOL            | TEST CONDITION         | MIN.  | TYP.                      | MAX.  | UNIT |
|--------------------------------------|-------------------|------------------------|-------|---------------------------|-------|------|
| Reference Voltage2                   | V <sub>B2</sub>   |                        | 0.985 | 1.000                     | 1.015 | V    |
| Input Bias Voltage2                  | I <sub>B2</sub>   |                        | –     | 20                        | 100   | nA   |
| Maximum Output Voltage2<br>(F.B Pin) | V <sub>OM+2</sub> | R <sub>NF</sub> =100kΩ | –     | V <sub>REF</sub><br>-0.15 | –     | V    |
|                                      | V <sub>OM-2</sub> | R <sub>NF</sub> =100kΩ | 0.6   | 0.75                      | 0.9   | V    |
| Maximum Source Current2<br>(F.B Pin) | I <sub>OM2</sub>  | V <sub>OM2</sub> =0.5V | 40    | 85                        | 200   | μA   |

### PWM COMPARE BLOCK

| PARAMETER                         | SYMBOL             | TEST CONDITION         | MIN.             | TYP. | MAX. | UNIT |
|-----------------------------------|--------------------|------------------------|------------------|------|------|------|
| Input Threshold Voltage (F.B Pin) | V <sub>TH0</sub>   | duty·cycle=0% (note)   | V <sub>OM-</sub> | 1.0  | 1.1  | V    |
| Input Threshold Voltage (F.B Pin) | V <sub>TH100</sub> | duty·cycle=100% (note) | –                | 1.4  | –    | V    |

### OUTPUT BLOCK

| PARAMETER                  | SYMBOL          | TEST CONDITION          | MIN. | TYP. | MAX. | UNIT |
|----------------------------|-----------------|-------------------------|------|------|------|------|
| L Output Voltage (OUT Pin) | V <sub>OL</sub> | I <sub>SINK</sub> =10mA | –    | 0.5  | 0.7  | V    |

### GENERAL CHARACTERISTICS

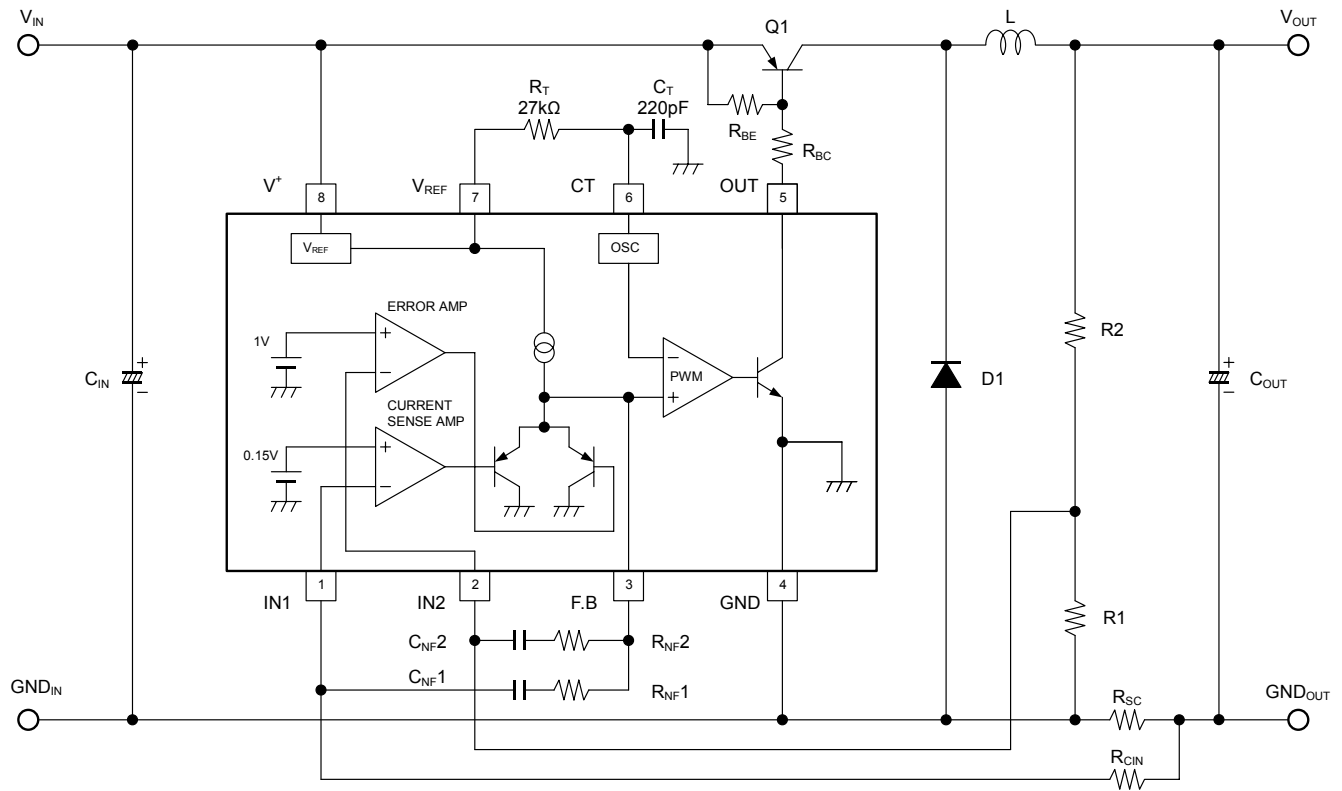
| PARAMETER                 | SYMBOL            | TEST CONDITION                    | MIN. | TYP. | MAX. | UNIT |
|---------------------------|-------------------|-----------------------------------|------|------|------|------|
| Average Quiescent Current | I <sub>CCAV</sub> | R <sub>L</sub> =∞, duty·cycle=50% | –    | 1.5  | 2.0  | mA   |

(note) Duty·Cycle is defined as follows:

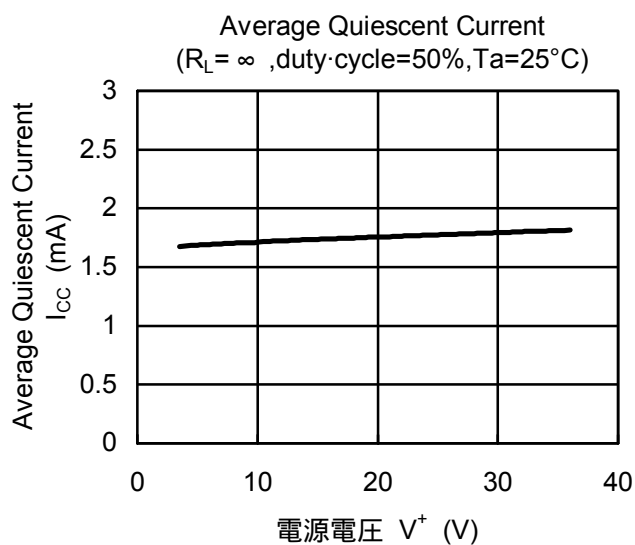
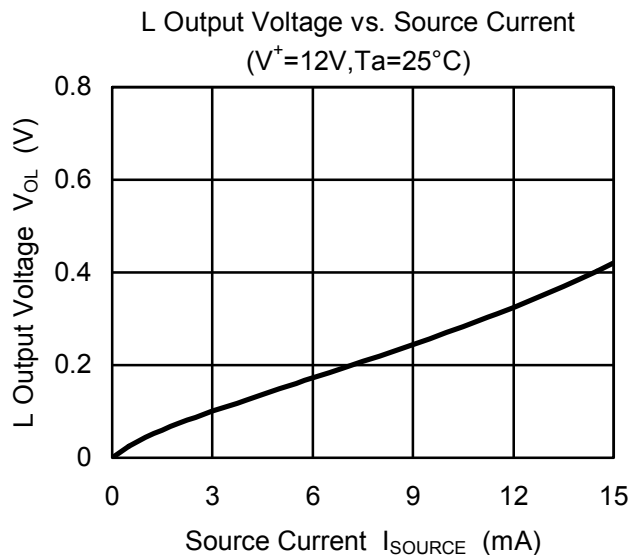
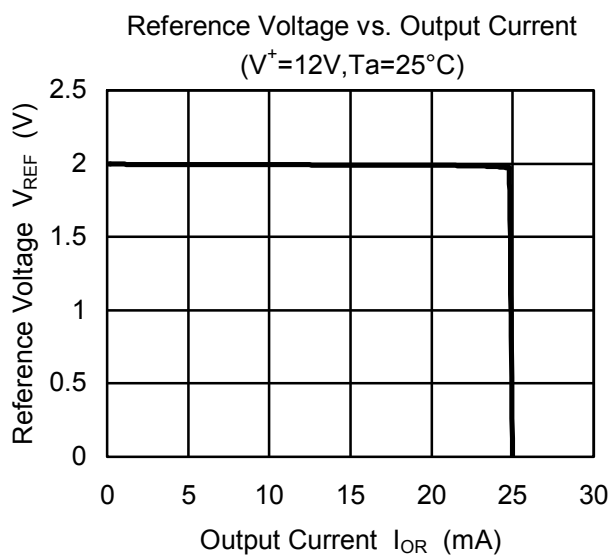
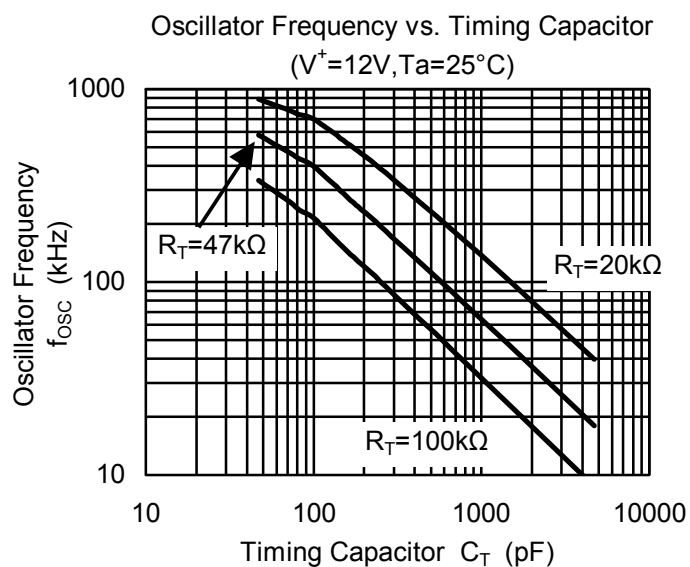
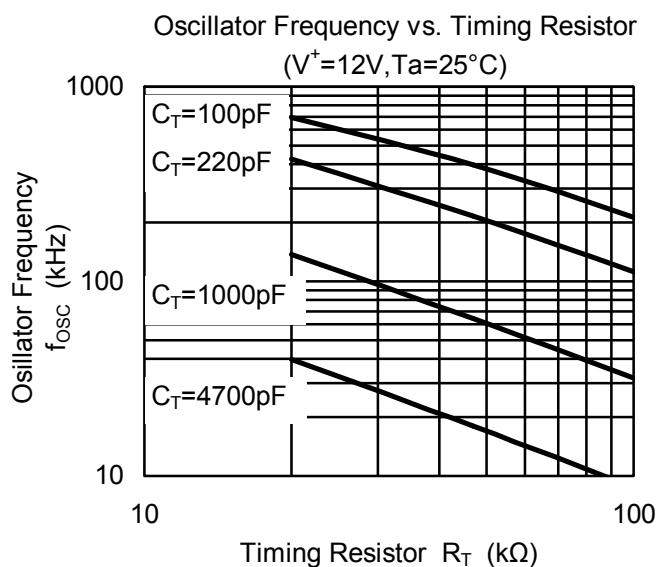
Duty·Cycle=0%: IC output transistor is OFF.

Duty·Cycle=100%: IC output transistor is ON.

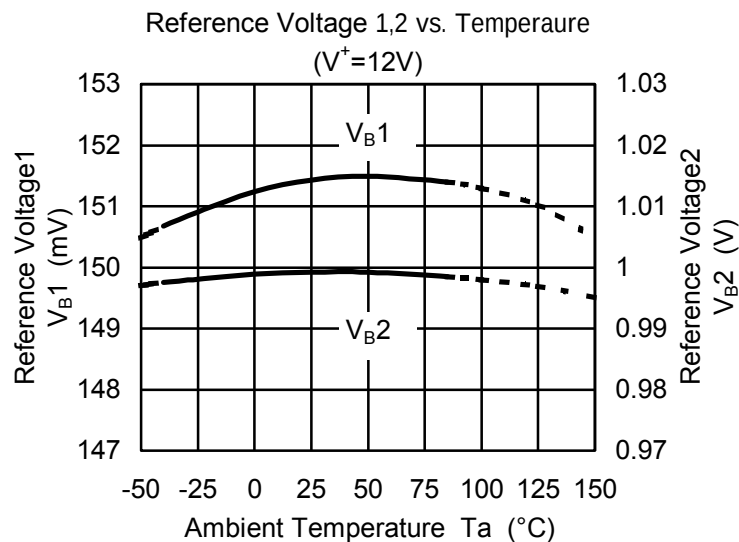
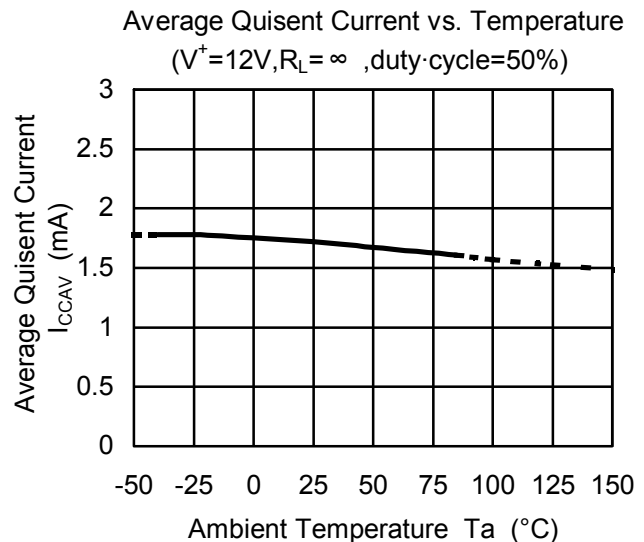
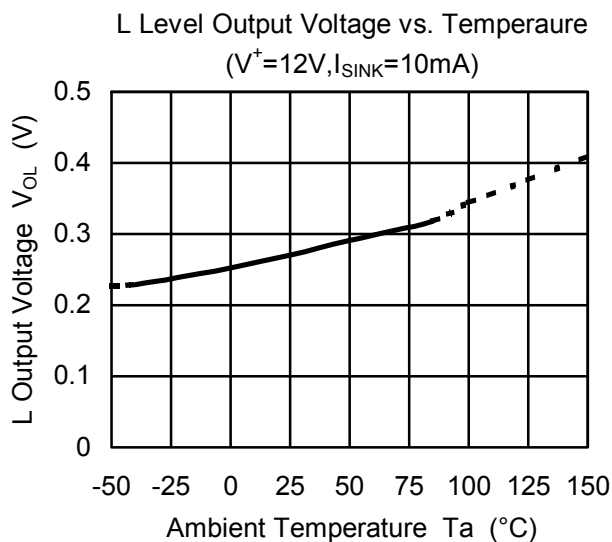
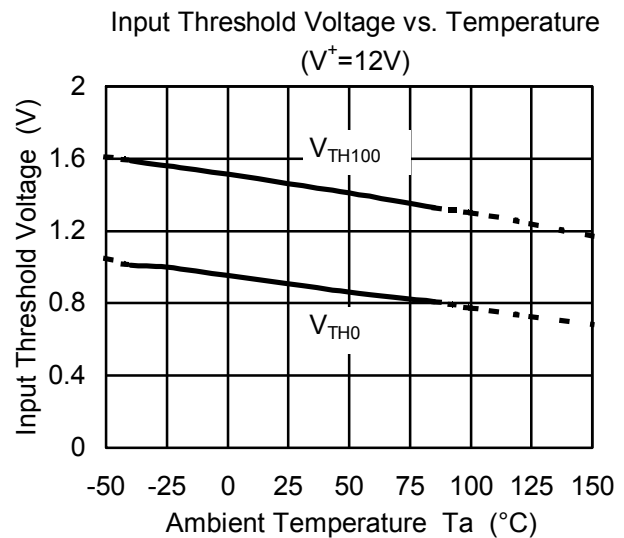
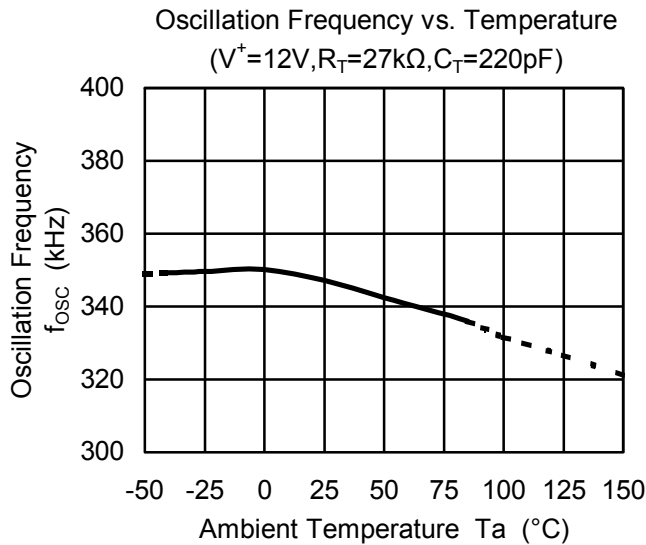
## ■TYPICAL APPLICATION



## ■TYPICAL CHARACTERISTICS



## TYPICAL CHARACTERISTICS



[CAUTION]  
The specifications on this databook are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.