

Single-Phase DC Brushless Motor Pre-driver IC

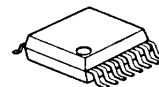
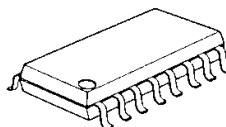
■ GENERAL DESCRIPTION

The NJM2660A is a Single-phase DC brushless motor pre-driver IC. It incorporates Lock Detect / Auto Protection Circuit and totem-pole pre - drivers for external power MOS-FET.

The turn ON / turn OFF ratio at Auto Protection Release was set in 1:10 easy-to-use.

Two comparators are built into NJM2660A for the temperature adjustable speed control or over current detection.

■ PACKAGE OUTLINE



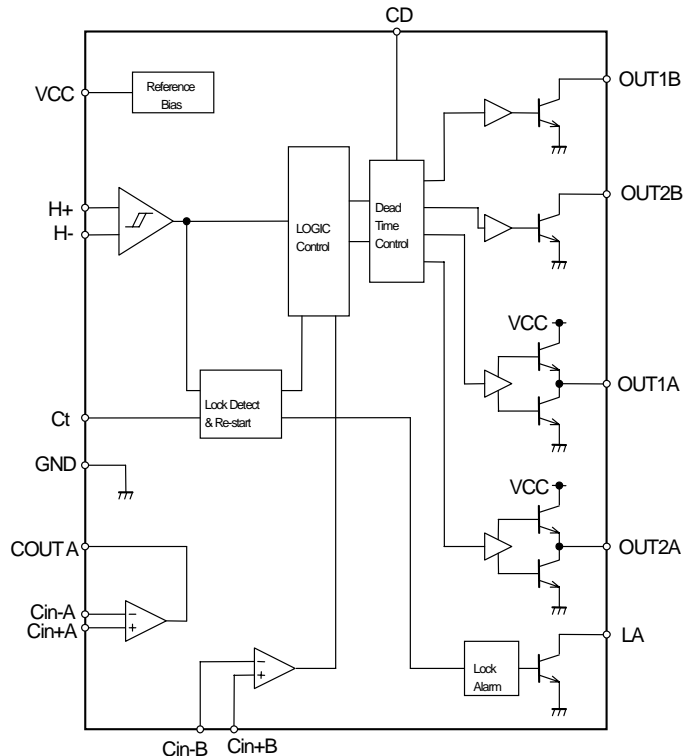
NJM2660AM

NJM2660AV

■ FEATURES

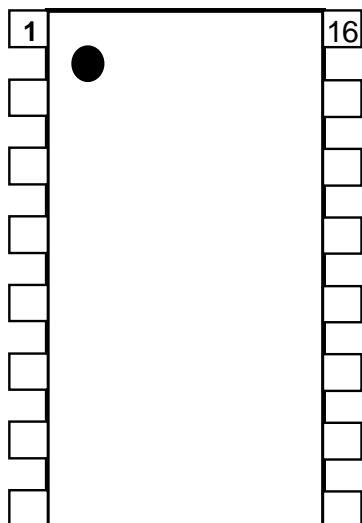
- Operating Voltage 4.5 to 30V
- Absolute Maximum Voltage 36V
- Totem-pole Output (Lower Arm)
- Internal Lock Detect /Auto Protection Release Circuit
- Lock Alarm Output Terminal
- Internal comparator 2 circuit
- Package Outline DMP16 SSOP16

■ PIN CONFIGURATION



NJM2660A

■ BLOCK DIAGRAM



| | |
|-----------|-----------|
| 1: Vcc | 9: GND |
| 2: H1 | 10: Ct |
| 3: H2 | 11: Cin-B |
| 4: LA | 12: Cin+B |
| 5: COUT A | 13: OUT2B |
| 6: Cin+A | 14: OUT1B |
| 7: Cin-A | 15: OUT2A |
| 8: CD | 16: OUT1A |

■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | RATINGS | UNIT | NOTE |
|--------------------------------------|--------|------------|------|----------------|
| Supply Voltage | Vcc | 36 | V | - |
| Hall Input Voltage Range | VHcmr | -0.3 ~ Vcc | V | - |
| Hall Input Differential Voltage | VHdff | 2 | V | - |
| A ch Output Current | IoMA | 50 | mA | - |
| B ch Output Current | IoMB | 50 | mA | - |
| Lock Alarm Output Voltage | VLA | 36 | V | - |
| Lock Alarm Output Current | IoLA | 20 | mA | - |
| Comparator Input Voltage Range | VCcmr | -0.3 ~ Vcc | V | - |
| Comparator Output Voltage | VoC | 36 | V | - |
| Comparator Output Current | IoC | 20 | mA | - |
| Power Dissipation | Pd | 435(DMP) | mW | Device it self |
| | | 375(SSOP) | mW | |
| Operating Temperature Range | Topr | -40 ~ 85 | °C | - |
| Operating Junction Temperature Range | Tj | -40 ~ 150 | °C | - |
| Storage Temperature Range | Tstg | -55 ~ 150 | °C | - |

■ RECOMMENDED OPERATING CONDITIONS

(Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT | NOTE |
|--------------------------------|--------|-----------|------|------|
| Supply Voltage | Vcc | 4.5 ~ 30 | V | Ct=0 |
| Hall Input Voltage Range | Vhi | 0 ~ Vcc-2 | V | - |
| Comparator Input Voltage Range | Vci | 0 ~ Vcc-2 | V | - |
| Junction Temperature | Tj | -20 ~ 125 | °C | - |

■ ELECTRICAL CHARACTERISTICS

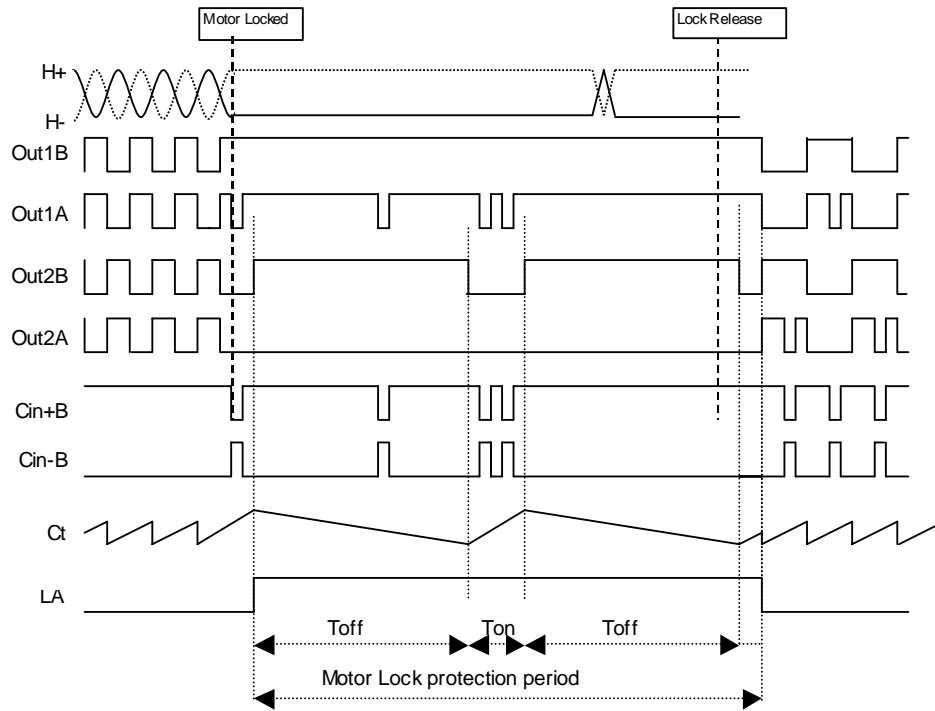
(Ta=25°C, V_{CC}=12V)

| PARAMETER | SYMBOL | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|----------------------------------|---------------------------------|-------------------------------------|--------------------|----------------------|------|------|
| ■ Total | | | | | | |
| Operating Current | I _{CC} | V _{CC} =12V | - | 8 | 12 | mA |
| | | V _{CC} =24V | - | 10 | 15 | mA |
| ■ Input / Output | | | | | | |
| Hall Input Hysteresis Voltage | V _{hys} | - | - | 20 | - | mV |
| Hall Input Bias Voltage | I _{hbias} | - | - | 0.5 | - | μA |
| A Upper Output Voltage | V _{OHA} | I _O =-20mA | V _{CC} -2 | V _{CC} -1.7 | - | V |
| A Lower Output Voltage | V _{O LA} | I _O =10mA | - | 0.3 | 0.7 | V |
| | | I _O =50mA | - | 1.8 | 2.2 | V |
| B Output Voltage | V _{O LB} | I _O =20mA | - | 0.3 | 0.7 | V |
| Ach Output Crump Voltage | V _{CLMP} | V _{CC} =30V | - | 16 | 20 | V |
| Bch Output Leak Voltage | I _{oleak} | V _O =30V | - | 1 | 3 | μA |
| Dead Time | T _d | C _d =10nF | - | 350 | - | μs |
| ■ Lock Detection | | | | | | |
| Lock Protect Operation Voltage | V _{LOP} | | 5.0 | - | - | V |
| Lock Alarm Output Voltage | V _{lock} | Lock Alarm ON, I _{LA} =5mA | - | - | 0.5 | V |
| Lock Alarm Leak Current | I _{LA} leak | V _{LA} =30V | - | 1 | 3 | μA |
| Charge Current | I _c | V _{CT} =1.5V | - | 4.0 | 5.5 | μA |
| Discharge Current | I _{dc} | V _{CT} =1.5V | - | 0.4 | 0.6 | μA |
| Charge / Discharge Current Ratio | I _c /I _{dc} | - | - | 10 | - | |
| H Level Cense Voltage | V _{ch} | - | 3.0 | 3.3 | 3.6 | V |
| Reversal Voltage | V _{cl} | - | 0.70 | 0.85 | 1.00 | V |
| Auto Protection Release ON Time | T _{on} | C _t =0.47μF | - | 0.25 | - | s |
| Auto Protection Release OFF Time | T _{off} | C _t =0.47μF | - | 2.5 | - | s |
| ■ Comparator Ach | | | | | | |
| Input Offset Voltage | V _{ioA} | - | - | 2 | 7 | mV |
| Input Bias Current | I _{ibA} | - | - | 30 | 200 | nA |
| Input Common Mode Voltage Range | V _{icmA} | - | 0 ~ 10 | - | - | V |
| Output Sink Current | I _{sink} | V _O =1.5V | 6 | 10 | - | V |
| Output Saturation Voltage | V _{sat} | I _{sink} =3mA | - | 80 | 300 | mV |
| Output Leak Current | I _{CLEAK} | V _O =30V | - | 1 | 3 | μA |
| ■ Comparator Bch | | | | | | |
| Input Offset Voltage | V _{ioB} | - | - | 2 | - | mV |
| Input Bias Current | I _{ibB} | - | - | 30 | - | nA |

A charge and discharge current ratio is set in general to a minimum of 7 and a maximum of 14.

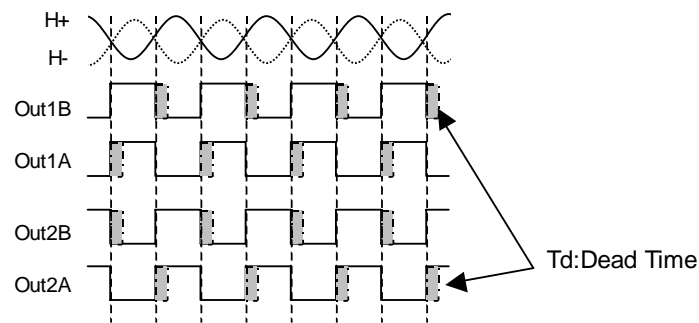
NJM2660A

TIME CHART



$$T_{on} = C_t \times \frac{V_{ch} - V_{cl}}{I_c} [S] \quad T_{off} = C_t \times \frac{V_{ch} - V_{cl}}{I_{dc}} [S]$$

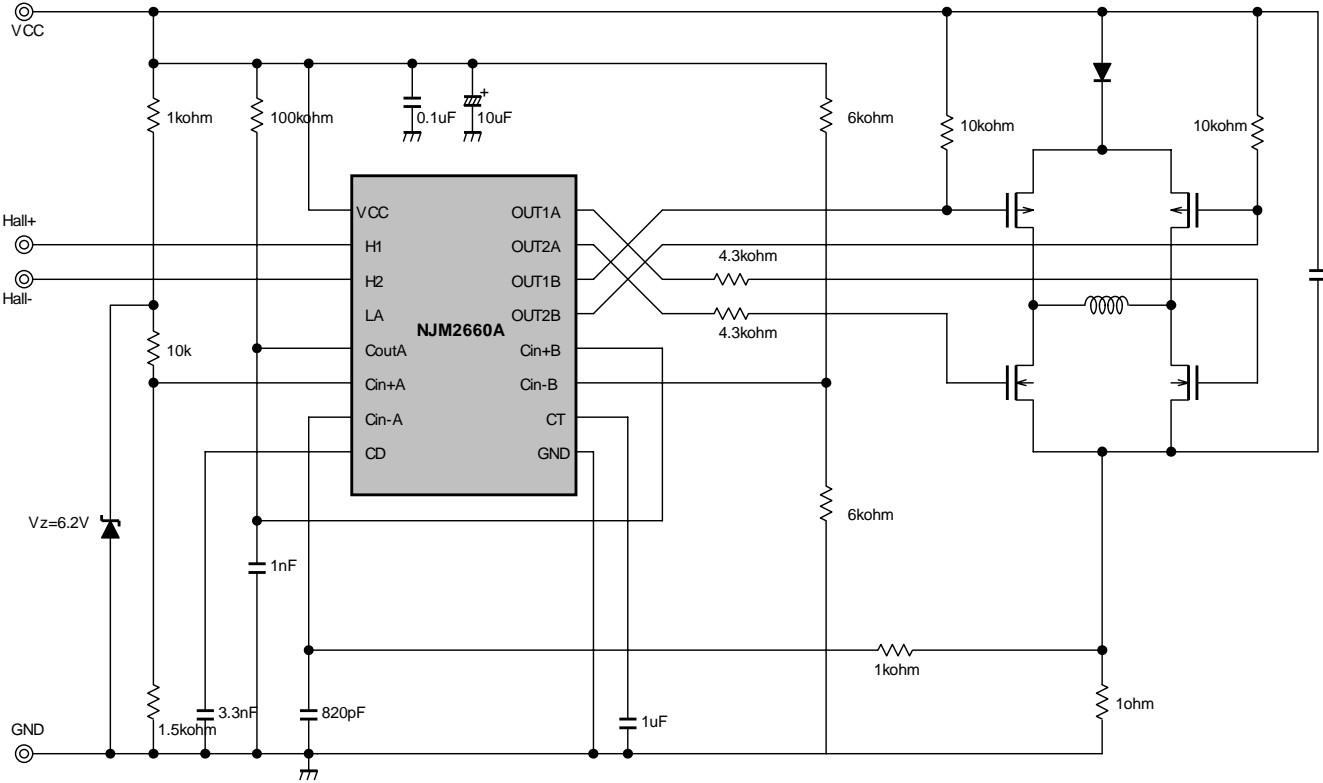
DEAD TIME



$$T_d = 35.4 \times 10^3 \times C_d [S]$$

■ TYPICAL APPLICATIONS 1

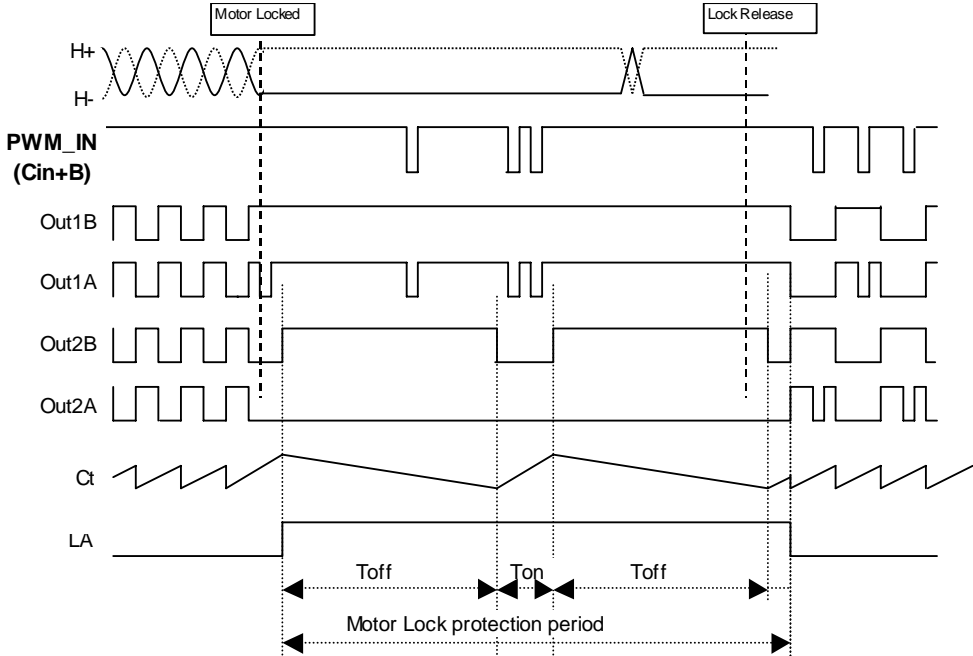
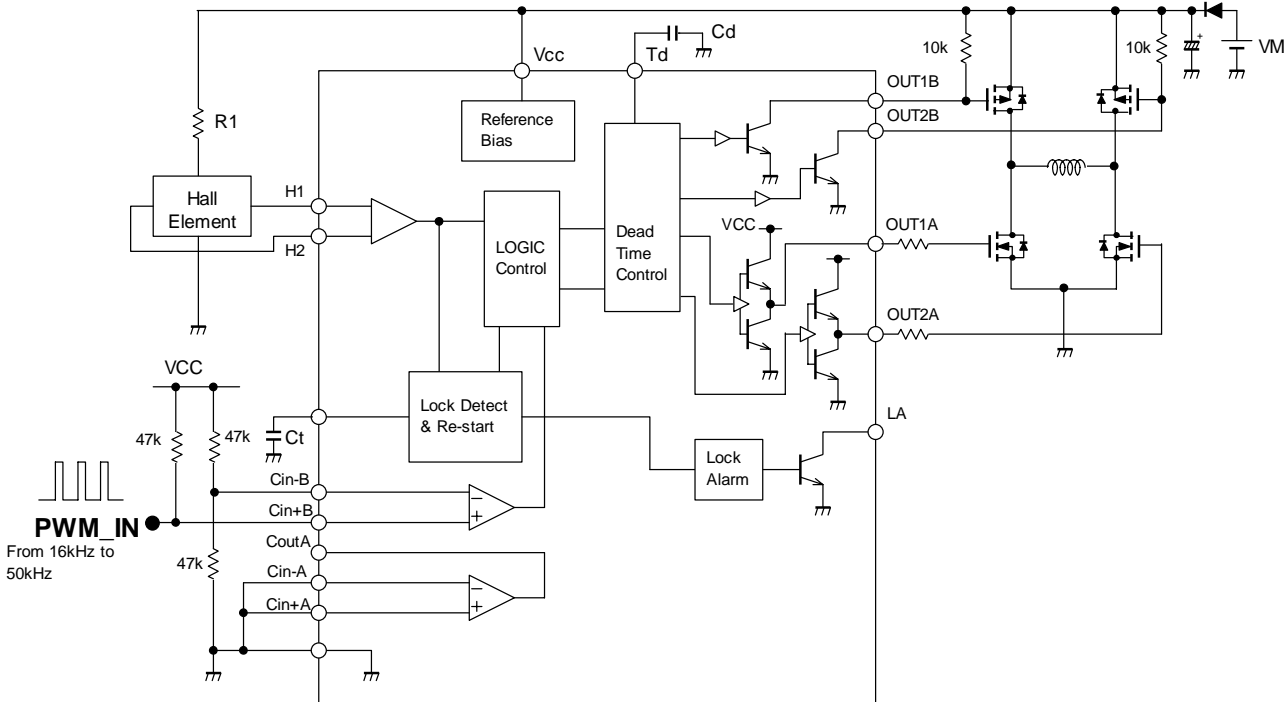
- Over Current Protection Application Circuit



Downloaded from Elcodis.com electronic components distributor

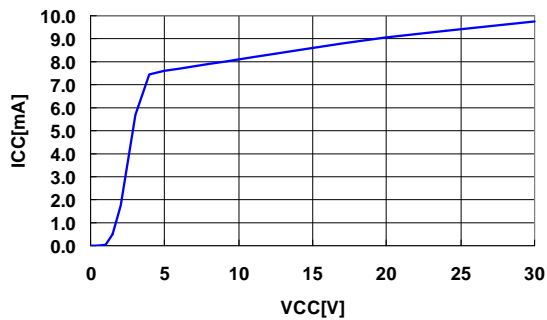
■ TYPICAL APPLICATIONS 3

- Direct PWM Speed Control Application Circuit

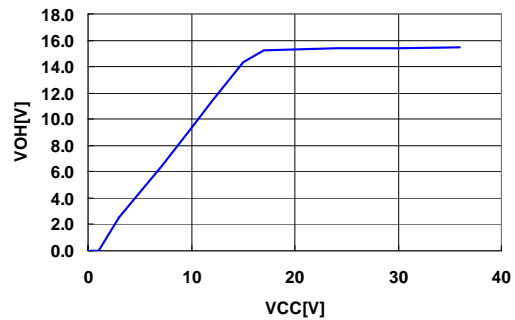


TYPICAL CHARACTERISTICS

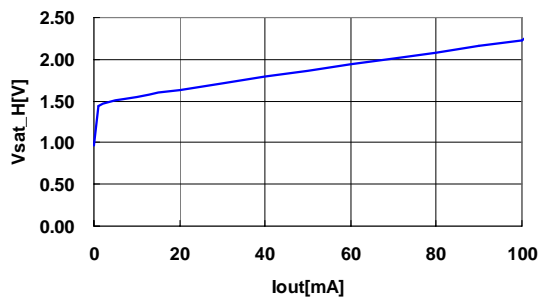
VCC vs ICC



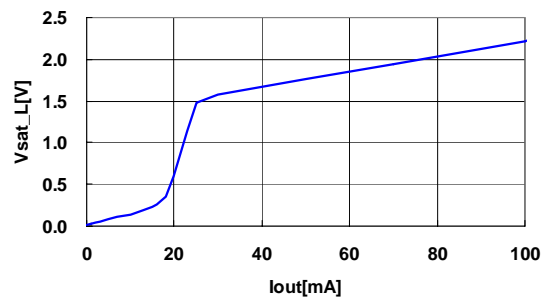
VCC vs VOH



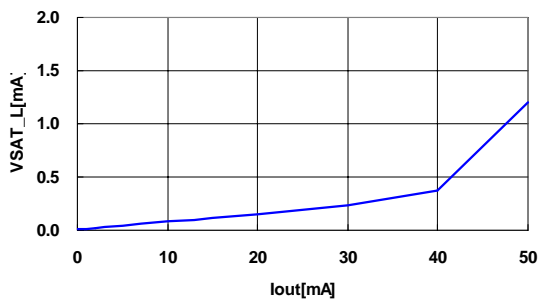
Iout vs Vsat_H(Ach)
VCC=12V



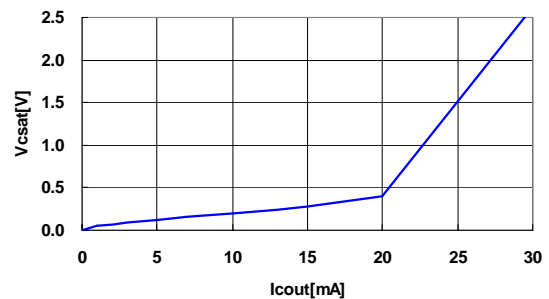
Iout vs Vsat_L(Ach)
VCC=12V



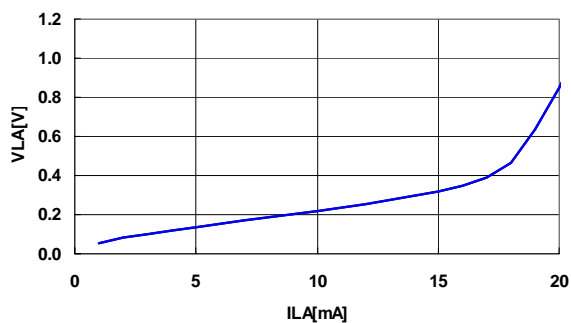
Iout vs Vsat_L(Bch)
VCC=12V



Icout vs Vcsat(Ach)
VCC=12V



ILA vs VLA
VCC=12V



[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.