Single-Phase DC Brushless Motor Pre-driver IC

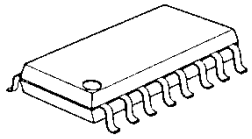
■ GENERAL DESCRIPTION

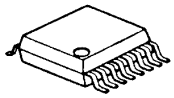
The NJM2660A is a Single-phase DC brushless motor pre-driver IC. It incorporates Lock Detect / Auto Protection Circuit and totem-pole pre - drivers for external power MOS-FET.

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

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

■ PACKAGE OUTLINE



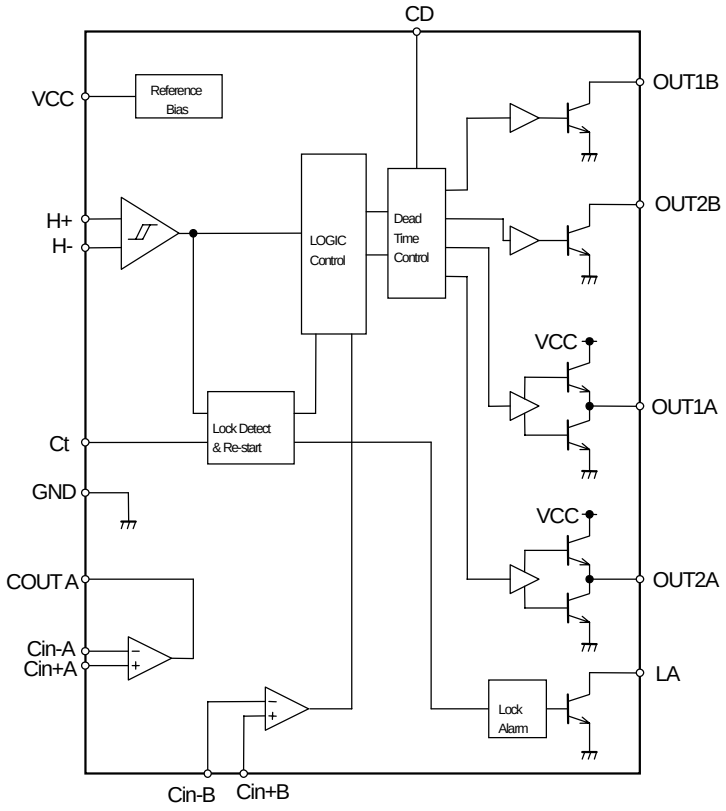


NJM2660AM NJM2660AV

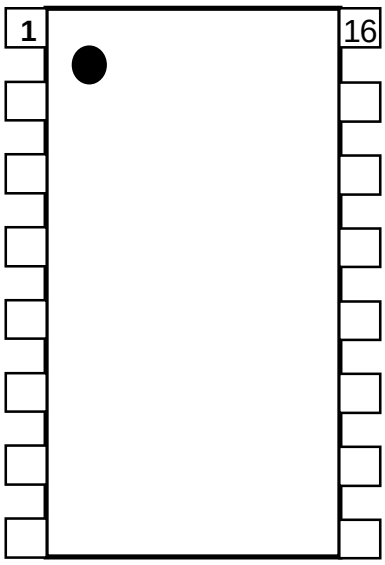
■ FEATURES

- 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



■ 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	V_OC	36	V	-
Comparator Output Current	I_OC	20	mA	-
Power Dissipation	P_D	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)

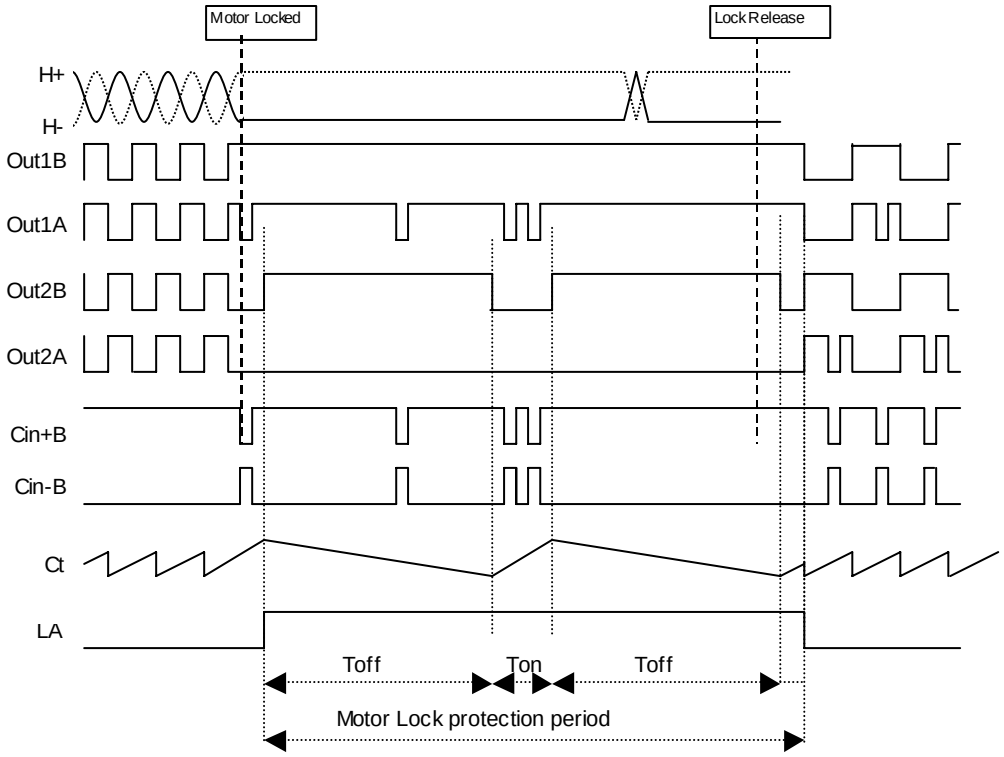
PARAMETER	SYMBOL	RATINGS	UNIT	NOTE
Supply Voltage	Vcc	4.5 ~30	V	Ct=0
Hall Input Voltage Range	Vhi	0 ~ Vcc-2	V	-
Comparator Input Voltage Range	Vci	0 ~ Vcc-2	V	-
Junction Temperature	Tj	-20 ~ 125	°C	-

■ **ELECTRICAL CHARACTERISTICS** (Ta=25°C, V_{CC}=12V)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
■Total						
Operating Current	Icc	Vcc=12V	-	8	12	mA
		Vcc=24V	-	10	15	mA
■Input / Output						
Hall Input Hysteresis Voltage	Vhys	-	-	20	-	mV
Hall Input Bias Voltage	Ihbias	-	-	0.5	-	µA
A Upper Output Voltage	V_OHA	I_O=-20mA	Vcc-2	Vcc-1.7	-	V
A Lower Output Voltage	V_OLA	Io=10mA	-	0.3	0.7	V
		Io=50mA	-	1.8	2.2	V
B Output Voltage	V_OLB	Io=20mA	-	0.3	0.7	V
Ach Output Crump Voltage	V_{CLMP}	Vcc=30V	-	16	20	V
Bch Output Leak Voltage	Ioleak	Vo=30V	-	1	3	µA
Dead Time	Td	Cd=10nF	-	350	-	µs
■Lock Detection						
Lock Protect Operation Voltage	V_{LOP}		5.0	-	-	V
Lock Alarm Output Voltage	Vlock	Lock Alarm ON, I_{LA}=5mA	-	-	0.5	V
Lock Alarm Leak Current	I_{LA}leak	V_{LA}=30V	-	1	3	µA
Charge Current	Ic	V_{CT}=1.5V	-	4.0	5.5	µA
Discharge Current	Idc	V_{CT}=1.5V	-	0.4	0.6	µA
Charge / Discharge Current Ratio	Ic/Idc	-	-	10	-	
H Level Cense Voltage	Vch	-	3.0	3.3	3.6	V
Reversal Voltage	Vcl	-	0.70	0.85	1.00	V
Auto Protection Release ON Time	Ton	Ct=0.47µF	-	0.25	-	s
Auto Protection Release OFF Time	Toff	Ct=0.47µF	-	2.5	-	s
■Comparator Ach						
Input Offset Voltage	VioA	-	-	2	7	mV
Input Bias Current	IibA	-	-	30	200	nA
Input Common Monde Voltage Range	VicmA	-	0 ~ 10	-	-	V
Output Sink Current	Isink	Vo=1.5V	6	10	-	V
Output Saturation Voltage	Vsat	Isink=3mA	-	80	300	mV
Output Leak Current	I_{CLEAK}	Vo=30V	-	1	3	uA
■Comparator Bch						
Input Offset Voltage	VioB	-	-	2	-	mV
Input Bias Current	IibB	-	-	30	-	nA

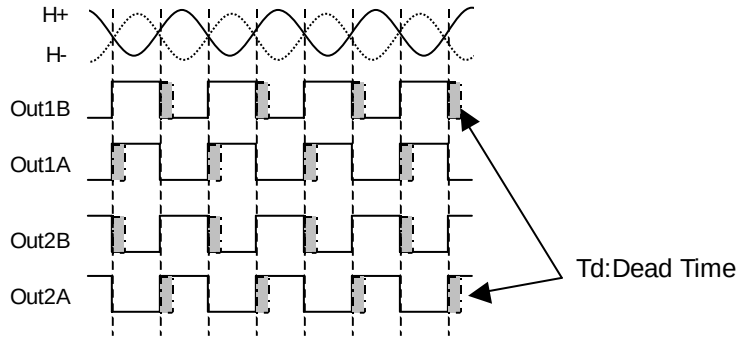
A charge and discharge current ratio is set in general to a minimum of 7 and a maximum of 14.

■ TIME CHART



$$Ton = Ct \times \frac{Vch - Vcl}{Ic}[S] \quad Toff = Ct \times \frac{Vch - Vcl}{Idc}[S]$$

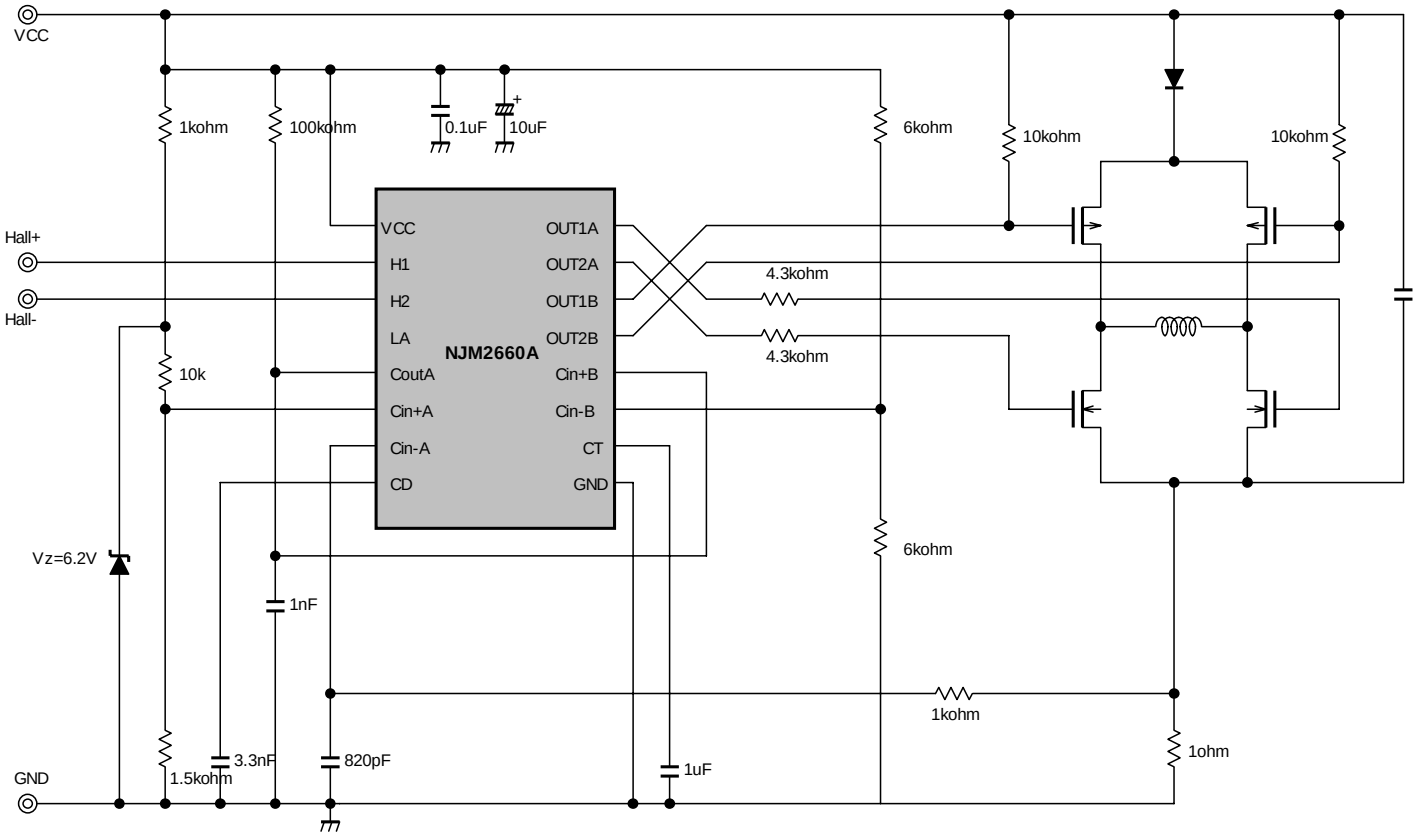
■ DEAD TIME



$$Td = 35.4 \times 10^{3} \times Cd[S]$$

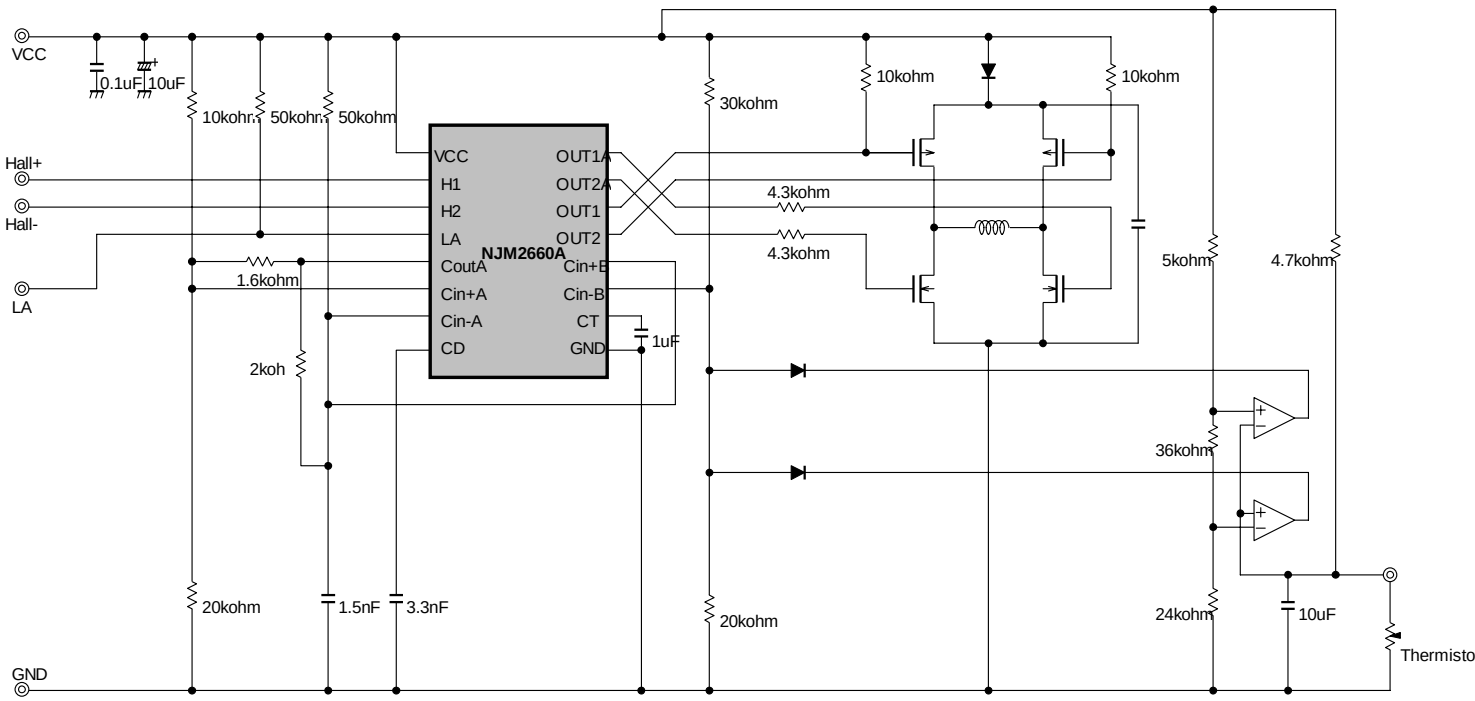
■ TYPICAL APPLICATIONS 1

• Over Current Protection Application Circuit



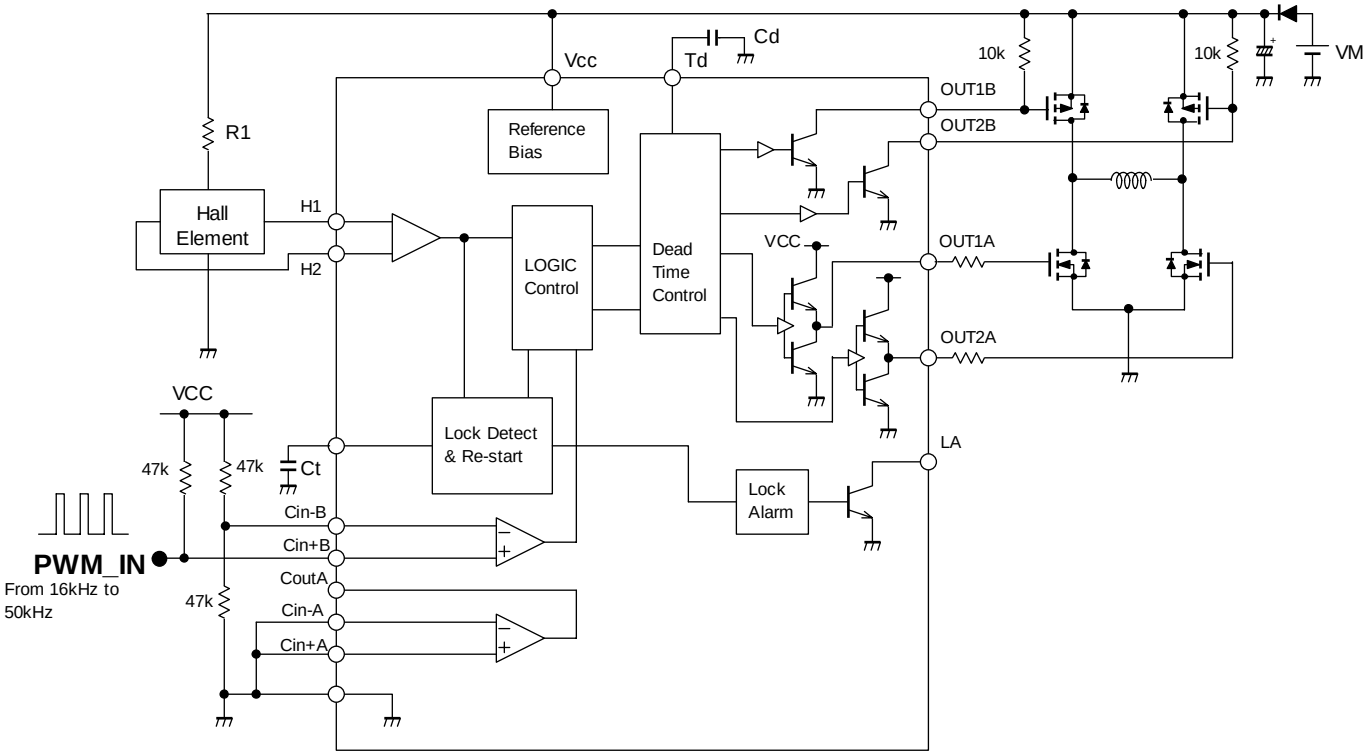
■ TYPICAL APPLICATIONS 2

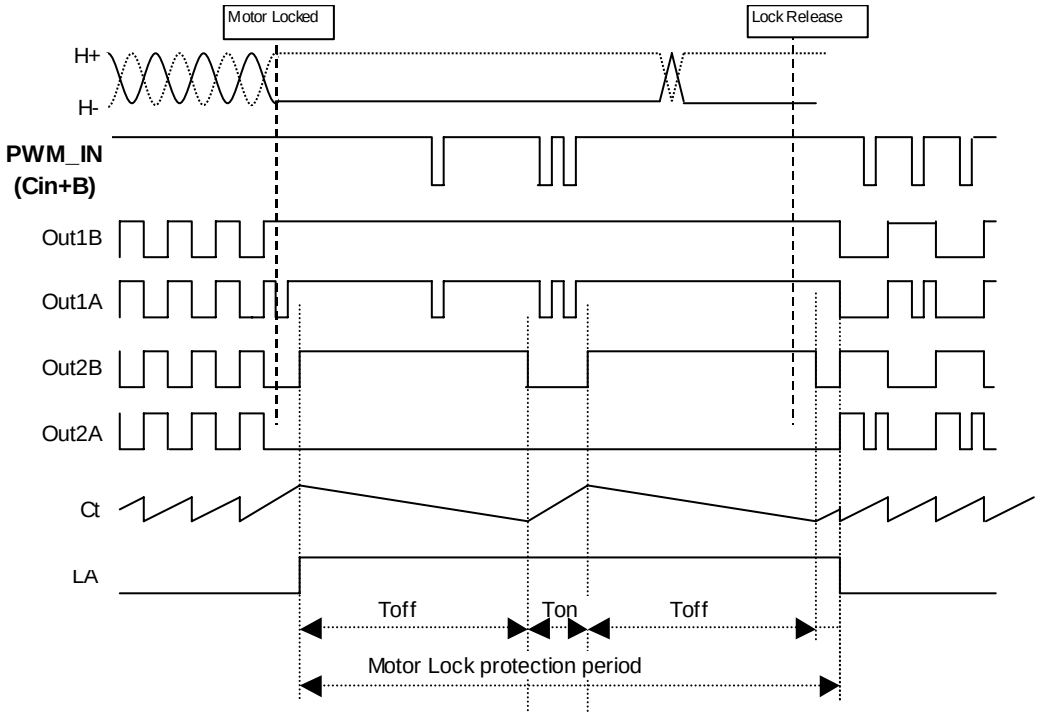
• Temperature Speed Control Application Circuit



■ TYPICAL APPLICATIONS 3

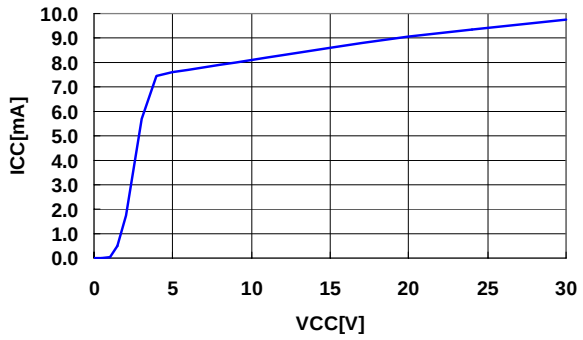
• Direct PWM Speed Control Application Circuit



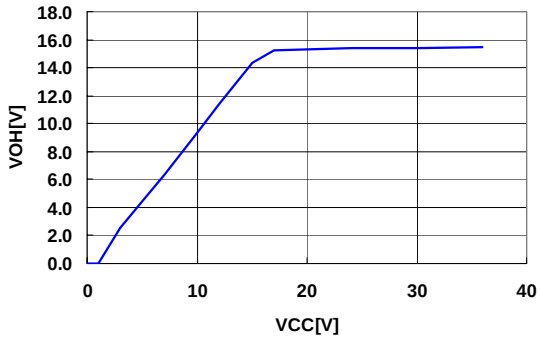


■ TYPICAL CHARACTERISTICS

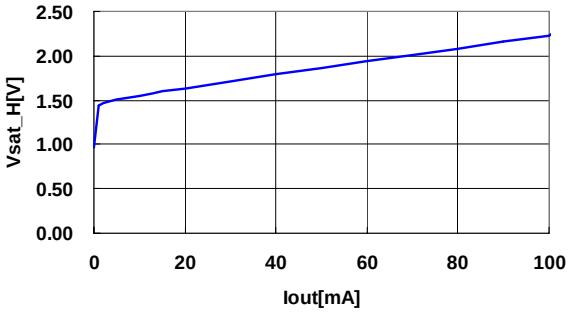
VCC vs ICC



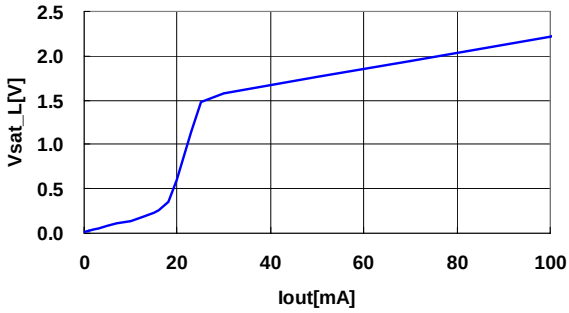
VCC vs VOH



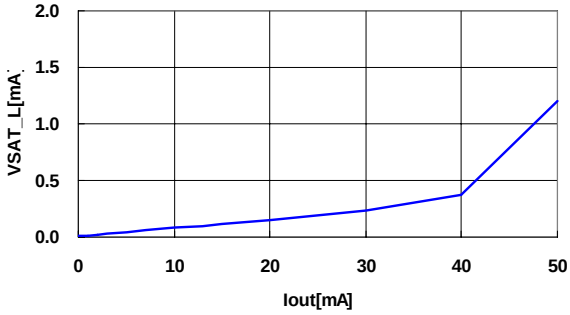
Iout vs Vsat_H(Ach)
VCC=12V



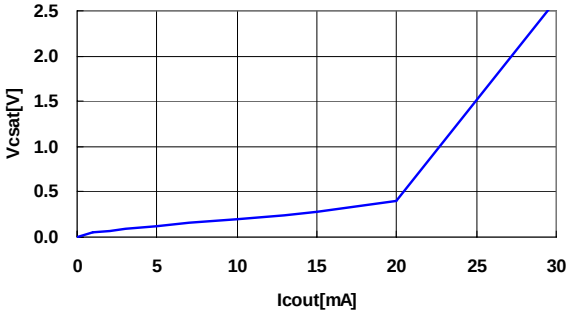
Iout vs Vsat_L(Ach)
VCC=12V



Iout vs Vsat_L(Bch)
VCC=12V



Icout vs Vcsat(Ach)
VCC-12V



ILA vs VLA
VCC=12V