

DUAL H BRIDGE DRIVER

■ GENERAL DESCRIPTION

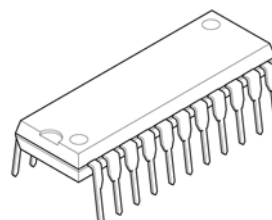
The NJM2670 is a general-purpose 60V dual H-bridge drive IC. It consists of a pair of H-bridges, a thermal shut down circuit and its alarm output. The alarm output can detect application problems and the system reliability will be significantly improved if monitored by Micro Processor.

Therefore, it is suitable for two-phase stepper motor application driven by microprocessor.

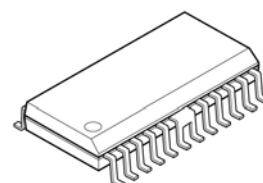
■ FEATURES

- Wide Voltage Range 4V to 60V
- Wide Range of Current Control 5 to 1500mA
- Thermal overload Protection
- Dead Band Protector
- Package Outline DIP22, SOP24-E3 (Batwing)

■ PACKAGE OUTLINE

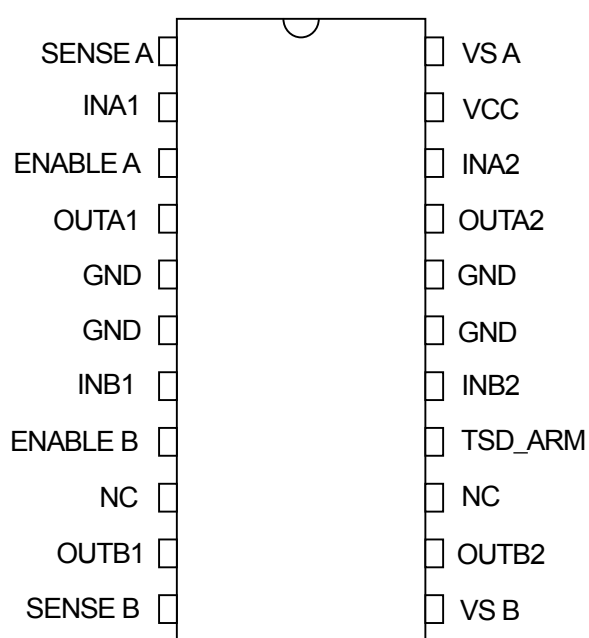


NJM2670D2
(DIP22)

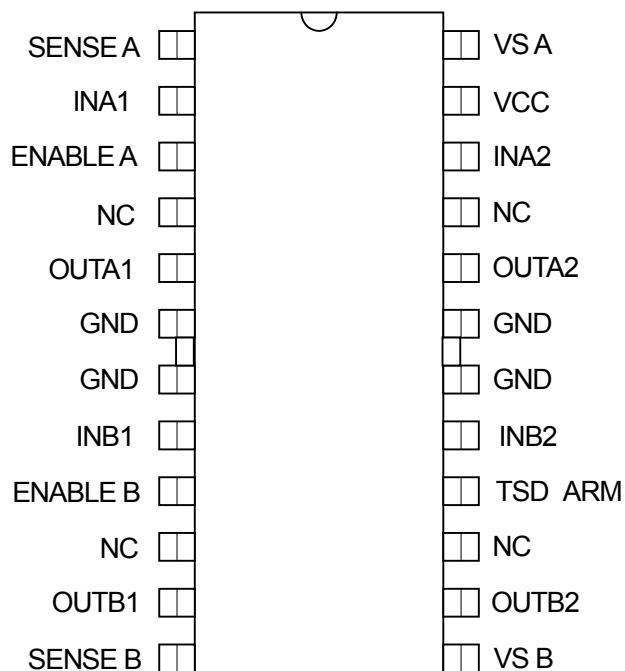


NJM2670E3
(SOP24-E3 Batwing)

■ PIN CONNECTION



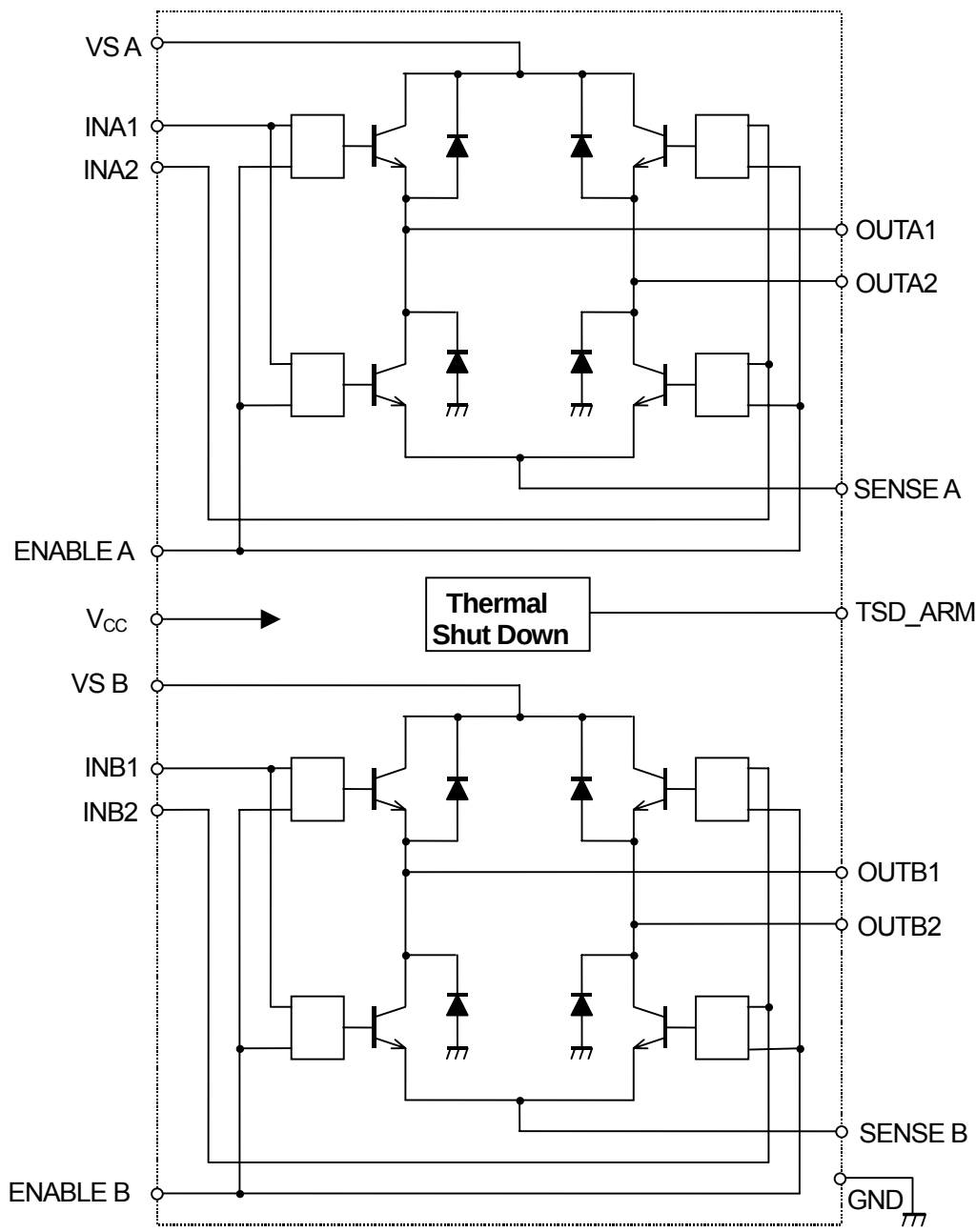
DIP-22



SOP24-E3

NJM2670

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Maximum Supply Voltage	V_{MM}	60	V
Logic Supply Voltage	V_{CC}	7	V
Input Voltage Range	V_{IN}	-0.3 to 7	V
Output Current	I_{OUT}	1.5	A
Power dissipation at $T_{GND}=+25^{\circ}\text{C}$, DIP and SOP package	P_{D25}	5	W
Power dissipation at $T_{GND}=+125^{\circ}\text{C}$, DIP package	P_{D125}	2.2	W
Power dissipation at $T_{GND}=+125^{\circ}\text{C}$, SOP package	P_{D125}	2	W
Operating Junction Temperature	T_{opr}	-40 ~ 85	°C
Storage Temperature	T_{stg}	-55 ~ 150	°C

■ RECOMENDDO OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{MM}		4	-	55	V
Logic Voltage Range	V_{CC}		4.75	5.00	5.25	V
Maximum Output Current	I_{OUT}		-	-	1.3	A
Operating junction temperature	T_j		-20	-	125	°C

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Thermal resistance	$R_{th_{j-GND}}$	DIP22 package.	-	11	-	°C/W
	$R_{th_{j-A}}$	DIP22 package. Note	-	40	-	°C/W
	$R_{th_{j-GND}}$	SOP24 package.	-	13	-	°C/W
	$R_{th_{j-A}}$	SOP24 package. Note	-	42	-	°C/W

Note : All ground pins soldered onto a 20 cm² PCB copper area with free air convection, $T_A=+25^{\circ}\text{C}$

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■ ELECTRICAL CHARACTERISTICS

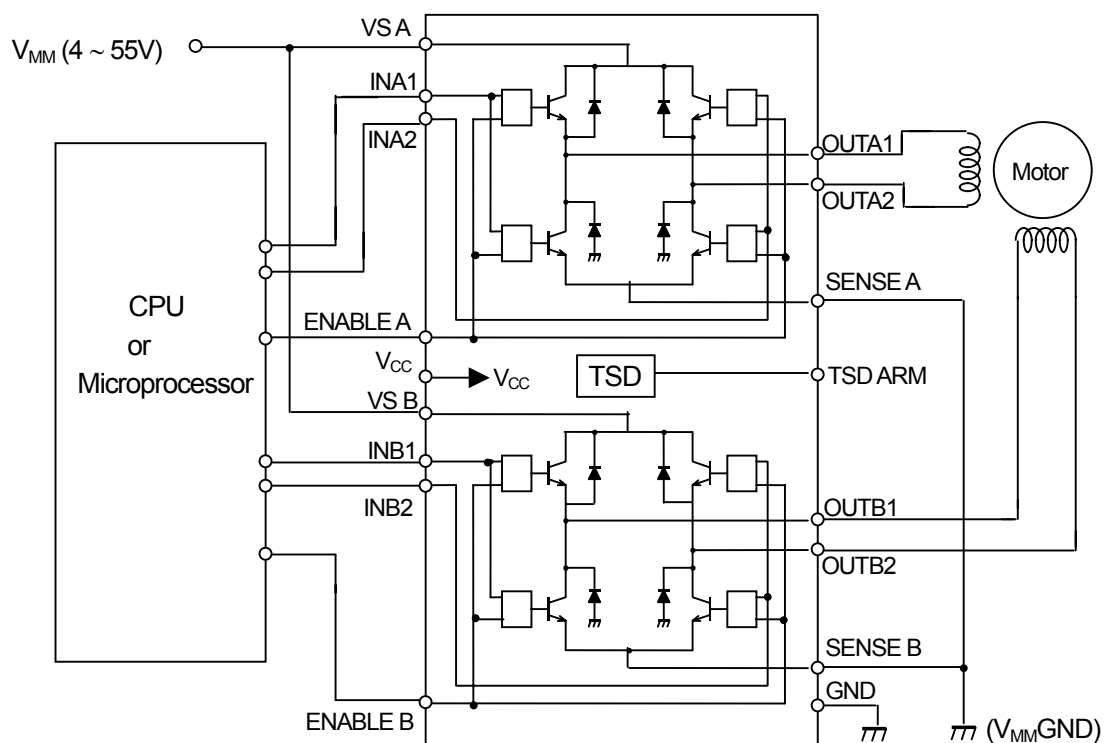
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
GENERAL						
Quiescent current	I _{cc}	Enable=H, IN1=IN3=L, IN2=IN4=H	-	40	-	mA
Thermal shutdown	T _{tsd}		-	170	-	°C
Off-State leak current	I _{tsd-LEAK}	TSD ARM=5V	-	-	50	μA
Thermal alarm output saturation	V _{tsd}	I _o =5mA	-	0.5	0.7	V
Dead time protection	T _d		-	1	-	μs
LOGIC						
Input LOW voltage	V _{IL}		-	-	0.6	V
Input HIGH voltage	V _{IH}		2	-	-	V
Input HIGH current	I _{IH}	V _i =2.4V	-	-	20	μA
Input LOW current	I _{IL}	V _i =0.4V	-0.4	-	-	mA
OUTPUT						
Upper transistor saturation	V _{OU1}	I _o =1000mA	-	1.3	1.5	V
	V _{OU2}	I _o =1300mA	-	1.5	1.8	V
Lower transistor saturation	V _{OL1}	I _o =1000mA	-	0.5	0.8	V
	V _{OL2}	I _o =1300mA	-	0.8	1.3	V
Upper diode forward	V _{fu1}	I _o =1000mA	-	1.3	1.6	V
	V _{fu2}	I _o =1300mA	-	1.6	1.9	V
Lower diode forward	V _{fl1}	I _o =1000mA	-	1.3	1.6	V
	V _{fl2}	I _o =1300mA	-	1.6	1.9	V
Output leakage current	I _{o-LEAK}	V _{MM} =50V	-	-	1	mA
Upper diode recovery time	T _{rrU}		-	250	-	ns
Lower diode recovery time	T _{rrL}		-	250	-	ns

■ TRUTH TABLE

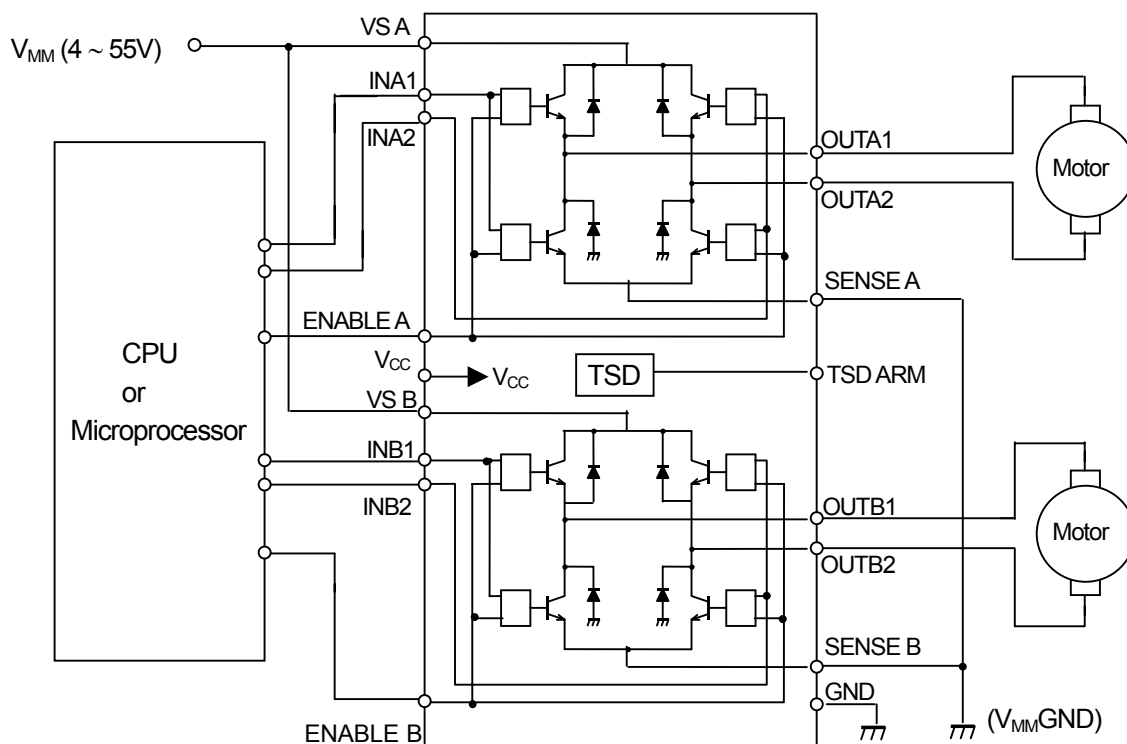
INPUT (L=Low, H=High, X=Don't care)			OUTPUT (H=Source, L=Sink)		OUTPUT mode
ENABLE A=H ENABLE B=H	INA1 INB1	INA2 INB2	OUTA1 OUTB1	OUTA2 OUTB2	
	L	L	L	L	short break mode
	L	H	L	H	CW
	H	L	H	L	CCW
	H	H	H	H	short break mode
ENABLE A=L ENABLE B=L	X	X	All Transistor turned OFF		

■ TYPICAL APPLICATION

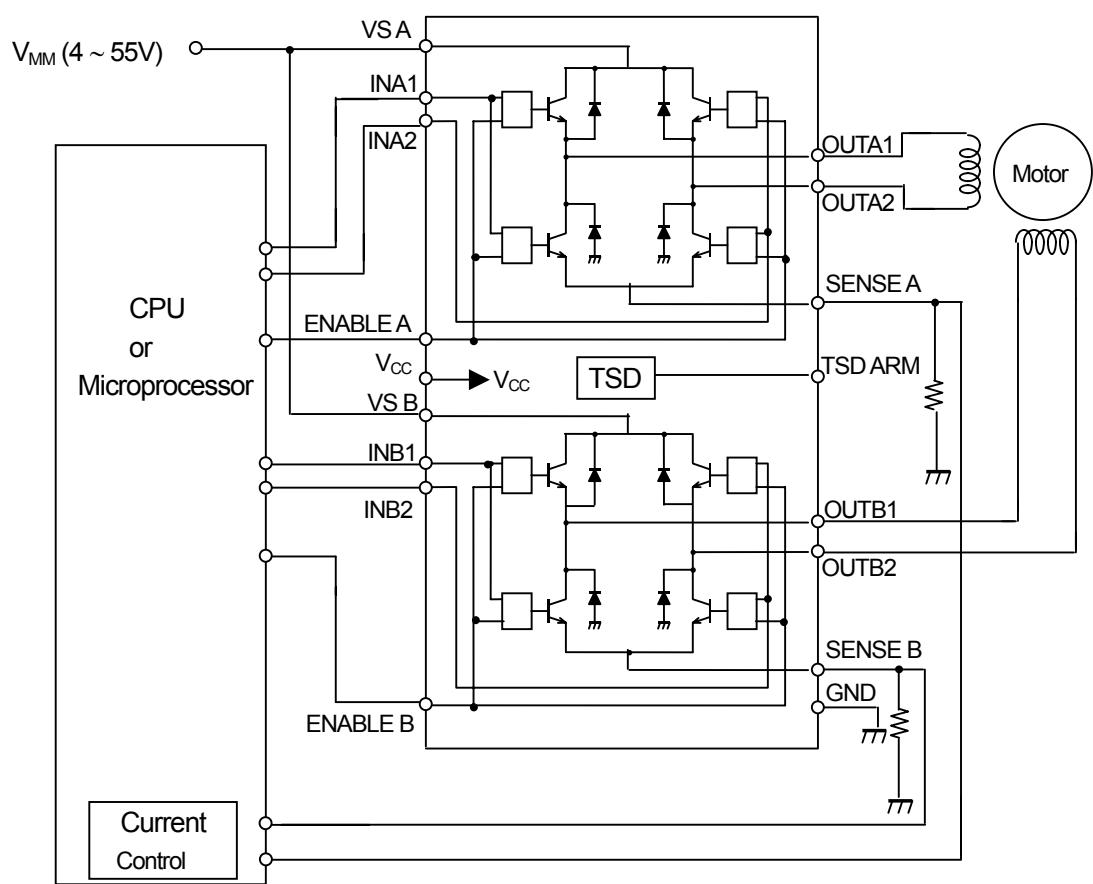
1). Bipolar Stepper Motor



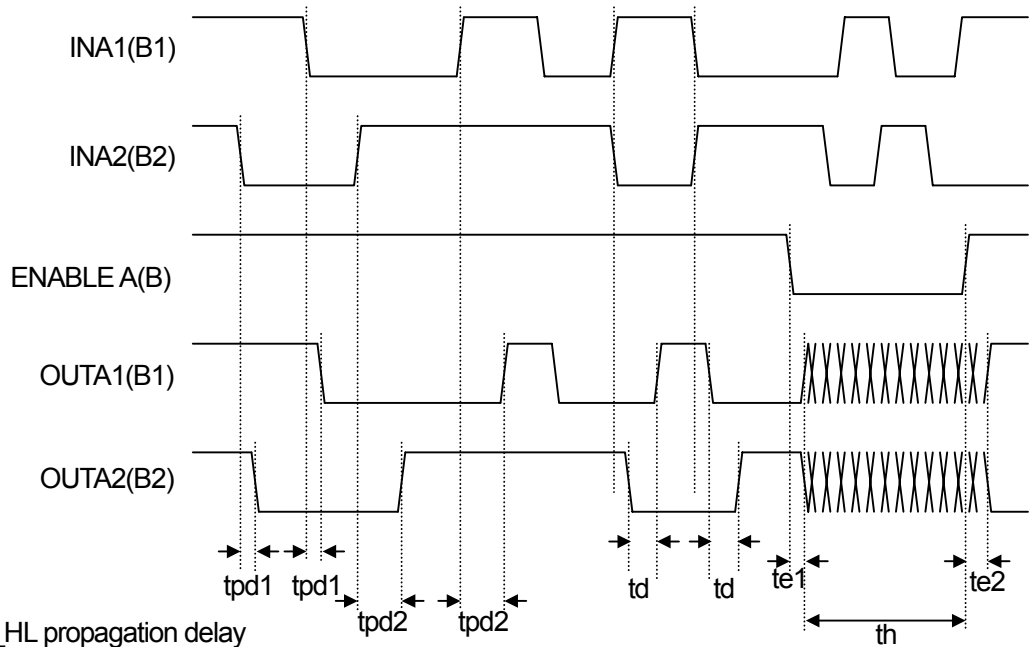
2). Single Phase DC Motor



3) Current Control Application for Bipolar Stepper Motor



■ TIMING CHART

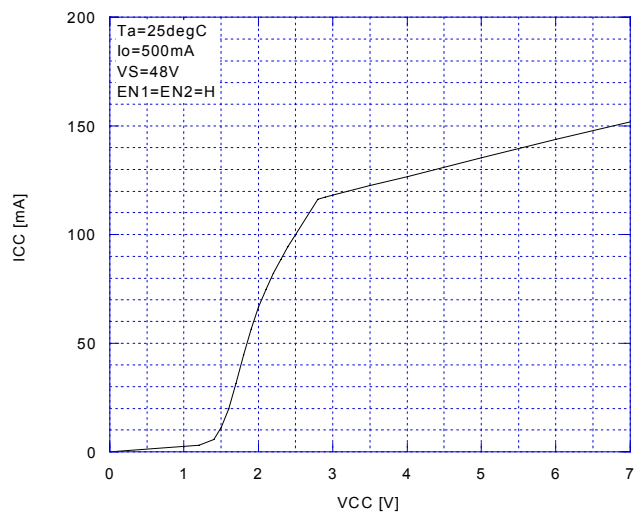


tpd1:IN_HL propagation delay
tpd2:IN_LH propagation delay
td :Output dead band protection delay
te1 :ENABLE_HL propagation delay
te2 :ENABLE_LH propagation delay
th :Output High impedance section

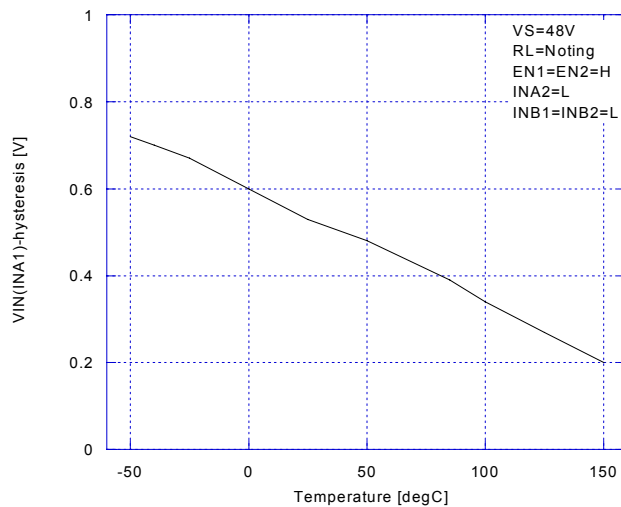
	Reference value	unit
tpd1	1.0	us
tpd2	2.5	us
td	1.5	us
te1	3.5	us
te2	2.0	us

■ TYPICAL APPLICATION 1

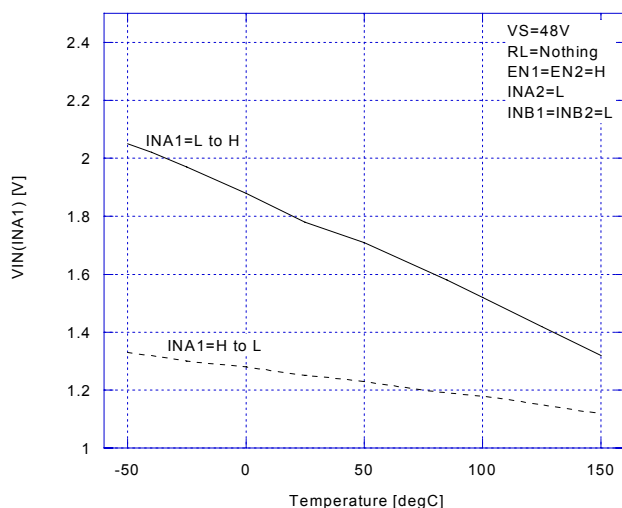
ICC vs. VCC



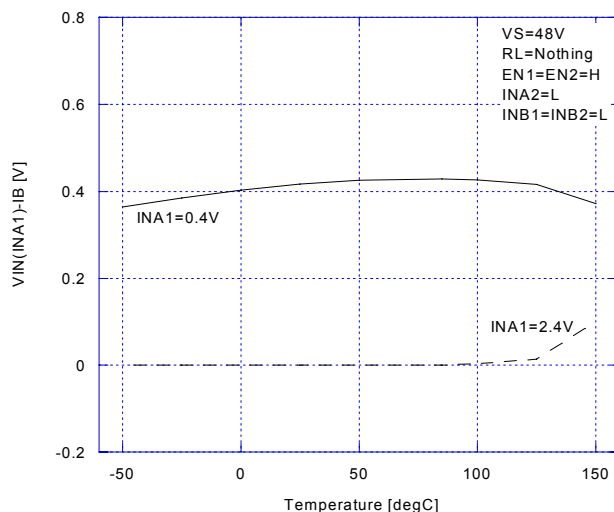
VIN(INA1)-hysteresis vs. Temperature



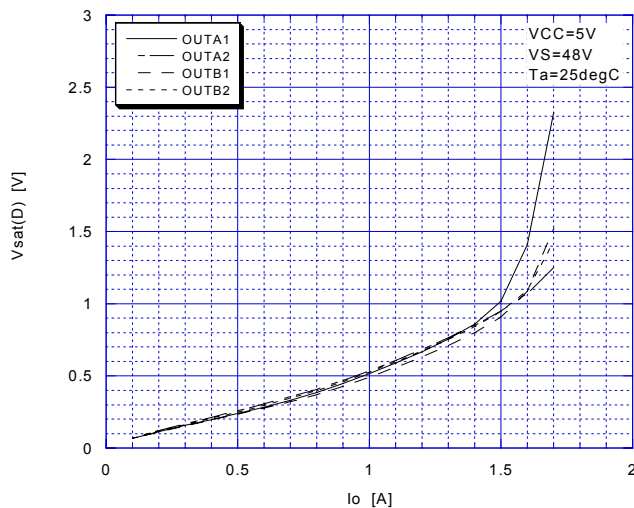
VIN(INA1) vs. Temperature



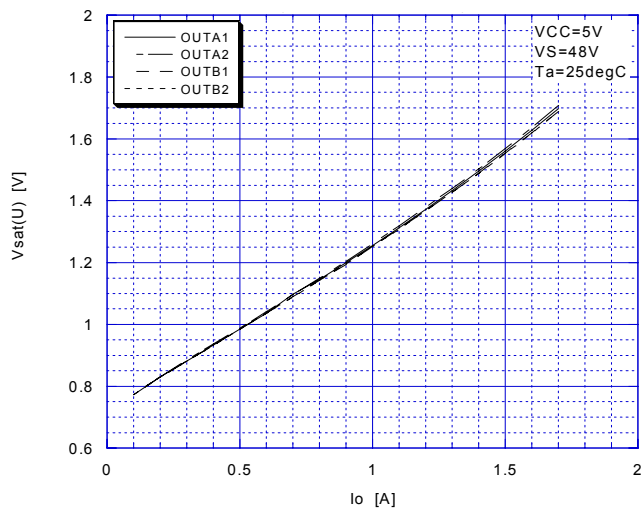
VIN(INA1)-IB vs. Temperature



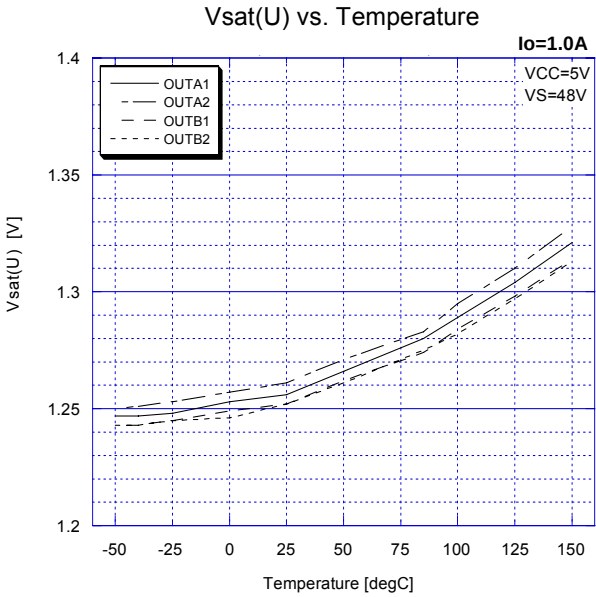
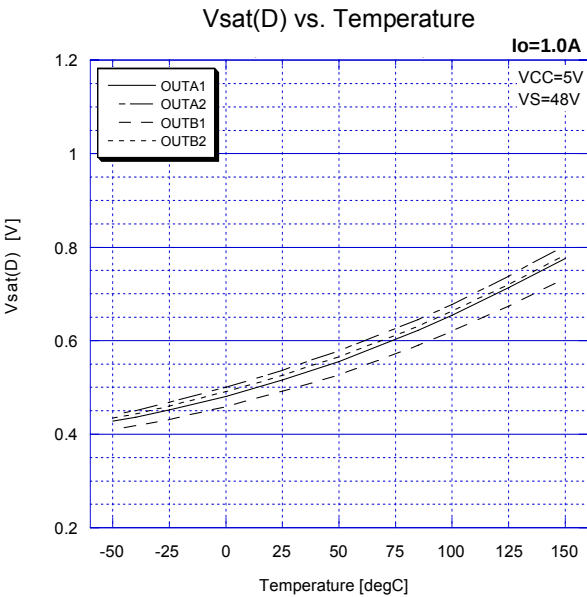
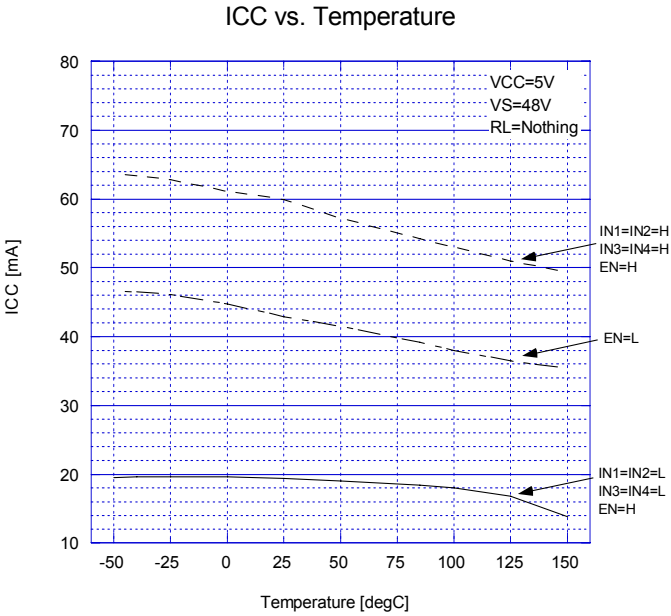
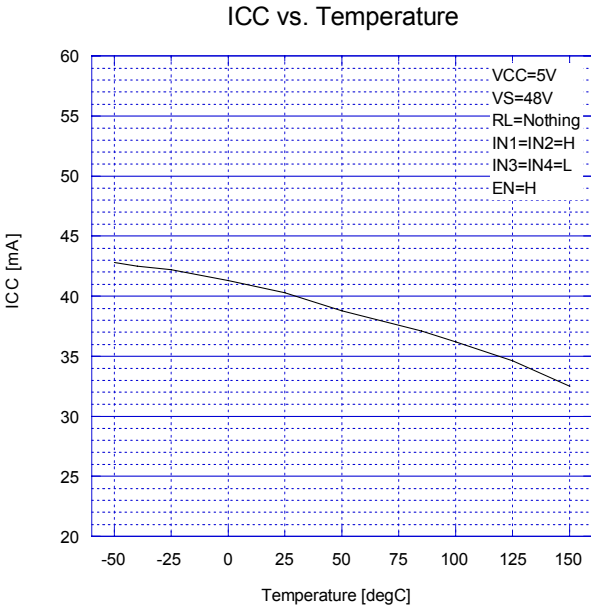
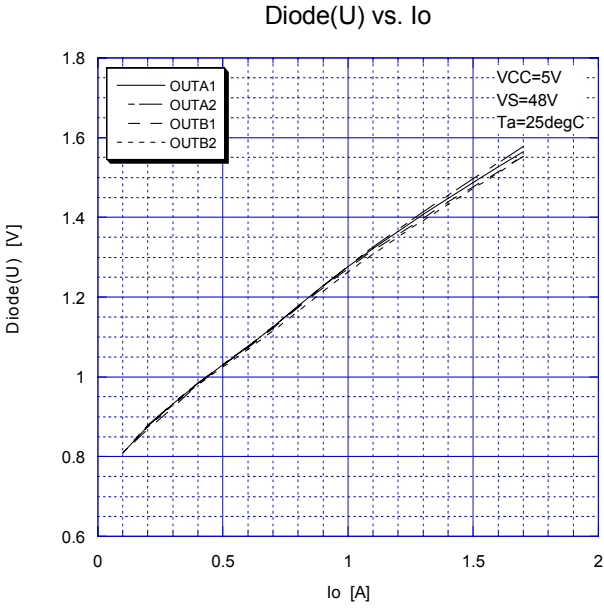
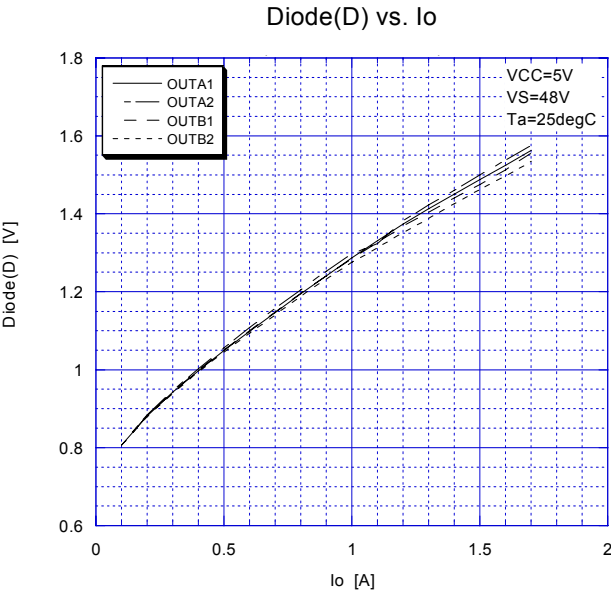
Vsat(D) vs. Io



Vsat(U) vs. Io

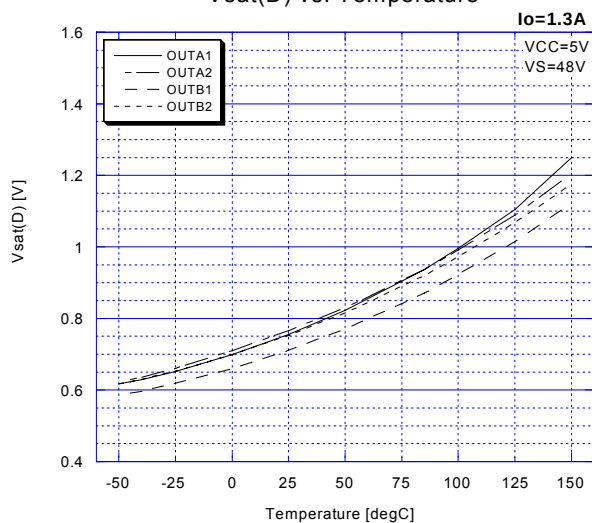


■ TYPICAL APPLICATION 2

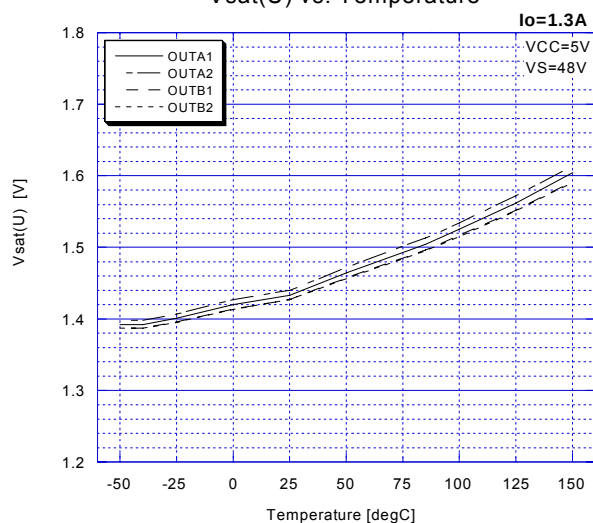


■ TYPICAL APPLICATION 3

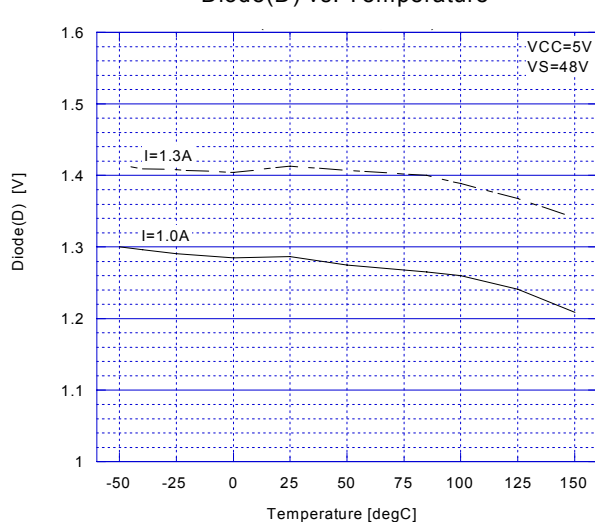
Vsat(D) vs. Temperature



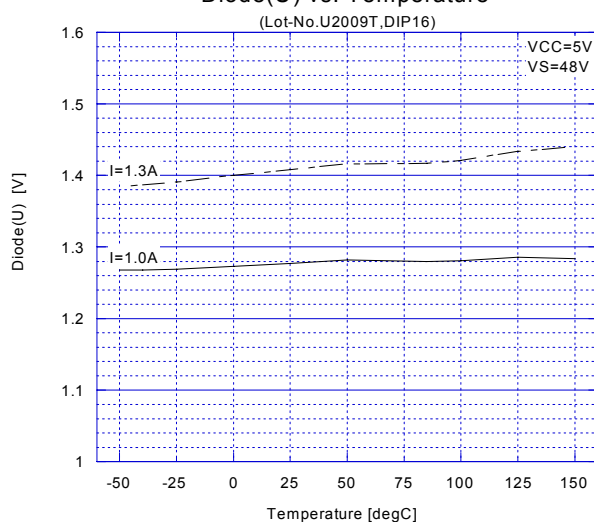
Vsat(U) vs. Temperature



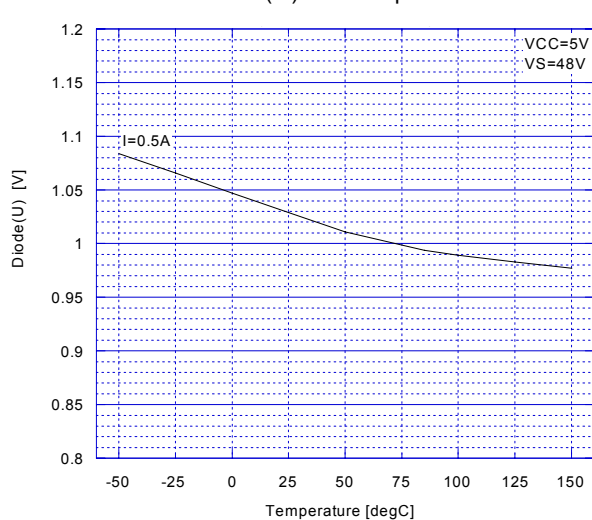
Diode(D) vs. Temperature



NJM2670
Diode(U) vs. Temperature
(Lot-No. U2009T, DIP16)



Diode(U) vs. Temperature



[CAUTION]

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