

Dual Half Bridge Driver

■ GENERAL DESCRIPTION

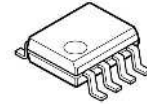
The NJW4810A is a general-purpose dual half bridge driver capable of supplying 1A current. Output duty=100% can be operated by high side P channel MOSFET. It can use as a full bridge driver by connecting VDD1 and VDD2.

The internal gate driver drives high-side/low-side power MOSFET; therefore, it is able to fast switching.

Additionally, it has protection features such as over current protection and thermal shutdown. And in the case of failure, it can output a fault flag.

It is suitable for power switching applications of DSP/micro controller.

■ PACKAGE OUTLINE

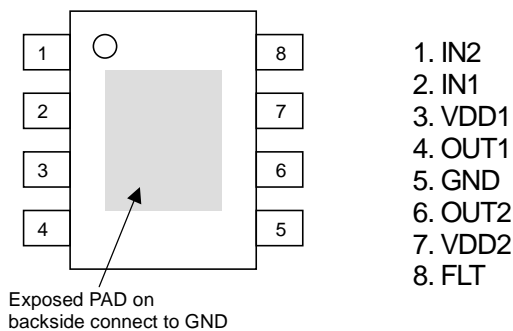


NJW4810AGM1

■ FEATURES

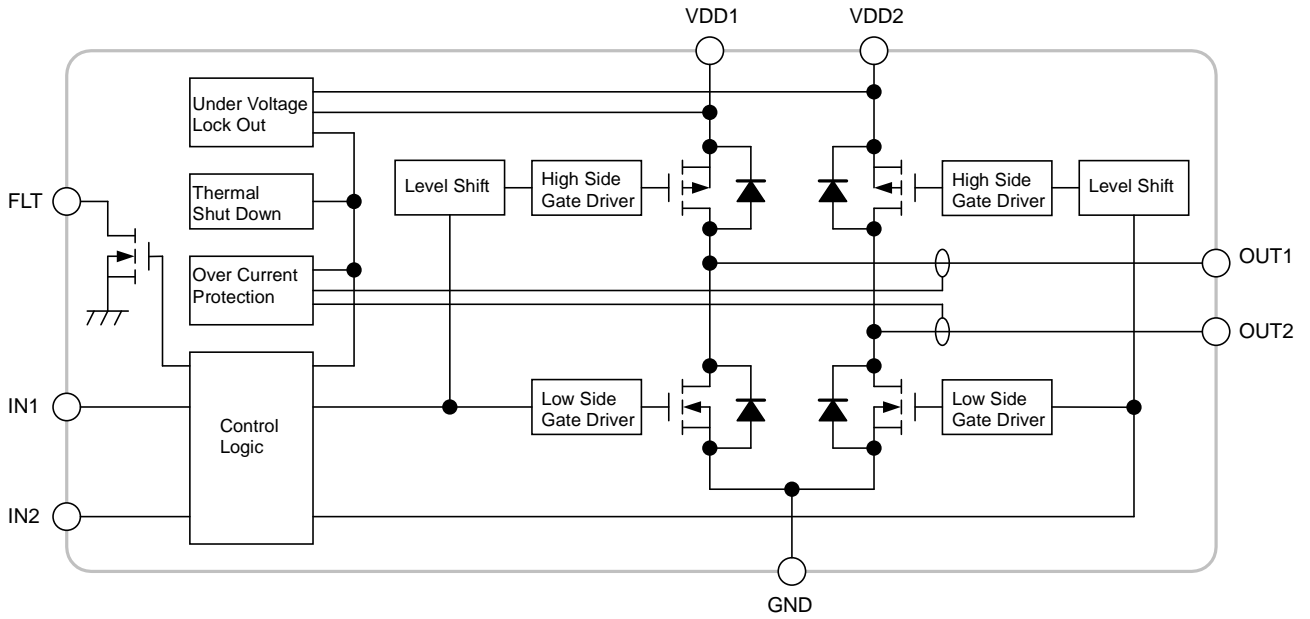
- Output Switch Current $\pm 1A$
- Operating Voltage 8.0V to 40V
- Thermal Shut Down
- Over Current Protection
- Under Voltage Lockouts
- Fault Indicator Output
- High Heat Radiation Package
- Package Outline HSOP8

■ PIN CONFIGURATION



NJW4810A

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT	REMARKS
Supply Voltage	V ⁺¹ , V ⁺²	+45	V	VDD1-GND pin VDD2-GND pin
Input Voltage	V _{IN}	-0.3 to +6	V	IN1-GND pin IN2-GND pin
FLT pin Voltage	V _{FLT}	-0.3 to +6	V	FLT-GND pin
FLT pin Current	I _{FLT}	1	mA	
Power Dissipation	P _D	0.9 (*1) 3.1 (*2)	W	-
Operating Junction Temperature	T _j	-40 to +150	°C	-
Operating Temperature Range	T _{opr}	-40 to +85	°C	-
Storage Temperature Range	T _{stg}	-50 to +150	°C	-

(*1): Mounted on glass epoxy board. (76.2 × 114.3 × 1.6mm:based on EIA/JDEC standard, 2Layers)

(*2): Mounted on glass epoxy board. (76.2 × 114.3 × 1.6mm:based on EIA/JDEC standard, 4Layers)

(For 4Layers: Applying 74.2 × 74.2mm inner Cu area and a thermal via hole to a board based on JEDEC standard JESD51-5)

■ RECOMMENDED OPERATING CONDITIONS

(Ta=25°C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
Operating Voltage	V ⁺¹ V ⁺²	8	-	40	V	VDD1-GND pin VDD2-GND pin
Output Switch Current	I _{OM}	0	-	1	A	OUT1, OUT2 pin
Input Voltage	V _{IN}	0	-	5.5	V	IN1-GND pin, IN2-GND pin
FLT pin Voltage	V _{FLT}	0	-	5.5	V	FLT-GND pin

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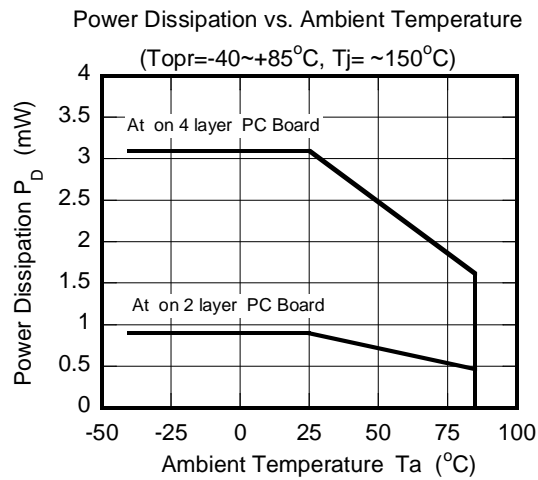
■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	THERMAL RESISTANCE	UNIT
Junction-to-Ambient Temperature	θ_{ja}	139 (*1)	°C/W
		40 (*2)	
Junction-to-Case	ψ_{jt}	19 (*1)	°C/W
		3.7 (*2)	

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(For 4Layers: Applying 74.2 × 74.2mm inner Cu area and a thermal via hall to a board based on JEDEC standard JESD51-5)



■ ELECTRICAL CHARACTERISTICS

(Unless otherwise noted, $V^+1=V^+2=12V$, $T_a=25^\circ C$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
General Characteristics							
Quiescent Current 1 (Operating)	I_{Q1}	$V_{IN1}=V_{IN2}=0V$	V^+1	–	0.9	1.7	mA
			V^+2	–	0.3	0.8	
Quiescent Current 2 (Switching)	I_{Q2}	$V_{IN1}=V_{IN2}=0V$ to $3V$, $f_{IN1}=f_{IN2}=750kHz$ antiphase 50% Duty Cycle	V^+1	–	3.7	5.5	mA
			V^+2	–	3.2	5.0	

Output Block

High-side SW ON Resistance	R_{DSH}	$I_{OSOURCE}=600mA$	–	1.0	1.8	Ω
Low-side SW ON Resistance	R_{DSL}	$I_{OSINK}=600mA$	–	0.75	1.3	Ω
Over Current Limit (*3)	I_{LIMIT}	High-side and Low-side	1	2	3	A
Over Current Limit Protection Time (*3)	t_{OCP}	High-side and Low-side $R_{FLT}=47k\Omega$, $V_{FLT}=5V$	15	30	80	ms
Output Rise Time	t_r	$V_{IN1}=V_{IN2}=0$ to $3V$	–	3	–	ns
Output Fall Time	t_f	$V_{IN1}=V_{IN2}=3$ to $0V$	–	5	–	ns
Dead Time	Dt	$V_{IN1}=V_{IN2}=0$ to $3V$	–	50	–	ns
Output Rise Delay Time	t_{d_ON}	$V_{IN1}=V_{IN2}=0$ to $3V$	–	120	–	ns
Output Fall Delay Time	t_{d_OFF}	$V_{IN1}=V_{IN2}=3$ to $0V$	–	120	–	ns
High-side SW Leak Current at OFF state	$I_{OLEAKOUTH}$	$V^+1=V^+2=5.5V$, $V_{OUT1}=V_{OUT2}=0V$	–	–	1	μA
Low-side SW Leak Current at OFF state	$I_{OLEAKOUTL}$	$V^+1=V^+2=5.5V$, $V_{OUT1}=V_{OUT2}=5.5V$	–	–	1	μA
OUT pin – VDD pin Potential Difference	V_{PDOV}	$I_{ORH}=1A$, $V^+1=V^+2=5.5V$	–	0.9	1.5	V
GND pin – OUT pin Potential Difference	V_{PDGO}	$I_{ORL}=1A$, $V^+1=V^+2=5.5V$	–	0.9	1.5	V

(*3): The overcurrent detection time may take $1\mu s$ (max). During this time overcurrent protection circuit does not detect an overcurrent. Therefore, you should control the pulse width and frequency of IN1/IN2 pin to prevent a continuous over-current in short-term.

Input Circuit Block

Input pin High Voltage	V_{IHIN}		2.0	–	5.5	V
Input pin Low Voltage	V_{ILIN}		0	–	0.8	V
Input pin sink current	I_{IIN}	$V_{IN1}=V_{IN2}=5.5V$	–	0.01	1	μA

Under Voltage Lockout (UVLO) Block

UVLO Release Voltage (*4)	V_{UVLO2}	$V^+1=V^+2=L \rightarrow H$	6.3	7.0	7.7	V
UVLO Operation Voltage (*4)	V_{UVLO1}	$V^+1=V^+2=H \rightarrow L$	6.0	6.7	7.4	V
UVLO Hysteresis Voltage	V_{UVLO}	$V_{UVLO2}-V_{UVLO1}$	–	0.3	–	V

(*4): UVLO operates at each line (V^+1 and V^+2)

Fault Function (FLT pin)

Low Level Output Voltage	V_{LFLT}	$I_{FLT}=500\mu A$	–	0.25	0.5	V
OFF Leak Current	$I_{OLEAKFLT}$	$V^+1=V^+2=5.5V$, $V_{FLT}=5.5V$	–	–	1	μA

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■ PIN OPERATION TABLE

INPUT			OUTPUT					Mode
IN1	IN2	VDD1, VDD2	FLT	OUT1 High-side SW	OUT1 Low-side SW	OUT2 High-side SW	OUT2 Low-side SW	
L	L	V^{+1} and $V^{+2} \geq V_{UVLO2}$	ON	OFF	ON	OFF	ON	Normal
L	H	V^{+1} and $V^{+2} \geq V_{UVLO2}$	ON	OFF	ON	ON	OFF	Normal
H	L	V^{+1} and $V^{+2} \geq V_{UVLO2}$	ON	ON	OFF	OFF	ON	Normal
H	H	V^{+1} and $V^{+2} \geq V_{UVLO2}$	ON	ON	OFF	ON	OFF	Normal
		V^{+1} or $V^{+2} < V_{UVLO1}$	OFF	OFF	OFF	OFF	OFF	UVLO

INPUT			OUTPUT					Mode
Tj	I _{OUT1}	I _{OUT2}	FLT	OUT1 High-side SW	OUT1 Low-side SW	OUT2 High-side SW	OUT2 Low-side SW	
Tj > 150°C			OFF	OFF	OFF	OFF	OFF	TSD (*5)
	I _{OUT1} ≥ I _{LIMIT}		OFF	OFF	OFF	OFF	OFF	OCP (*6)
		I _{OUT2} ≥ I _{LIMIT}	OFF	OFF	OFF	OFF	OFF	OCP (*6)

(*5): After the TSD function operation, when the junction temperature becomes less than 125°C, NJW4810A returns to normal mode.

(*6): NJW4810A returns to normal mode after the elapse of a certain period of time after the OCP function operating.

■ TIMING CHART

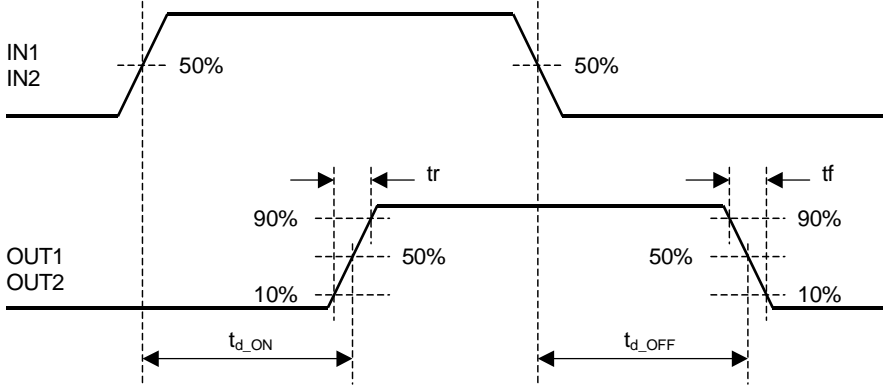


Fig1. Output Rise/Fall Time, PWM Rise/Fall Delay Time

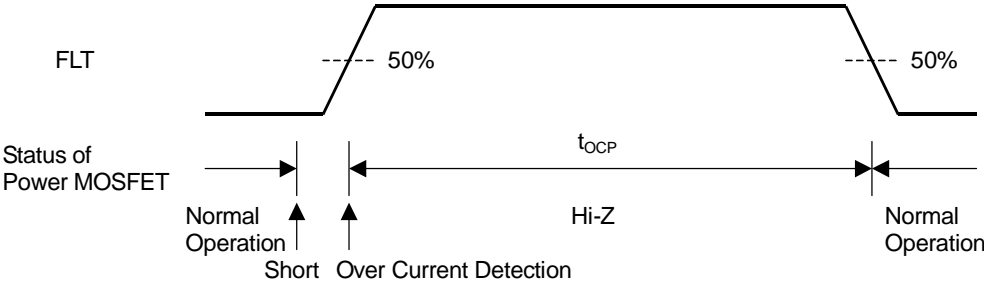


Fig2. Over Current Limit Protection Time

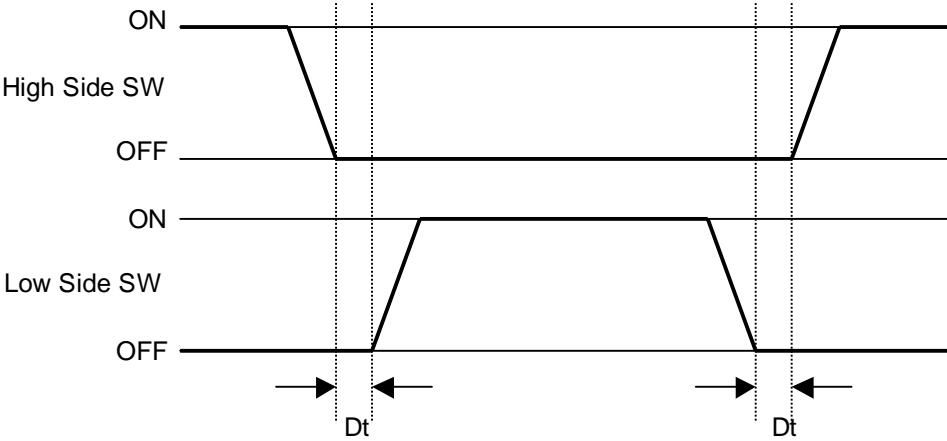
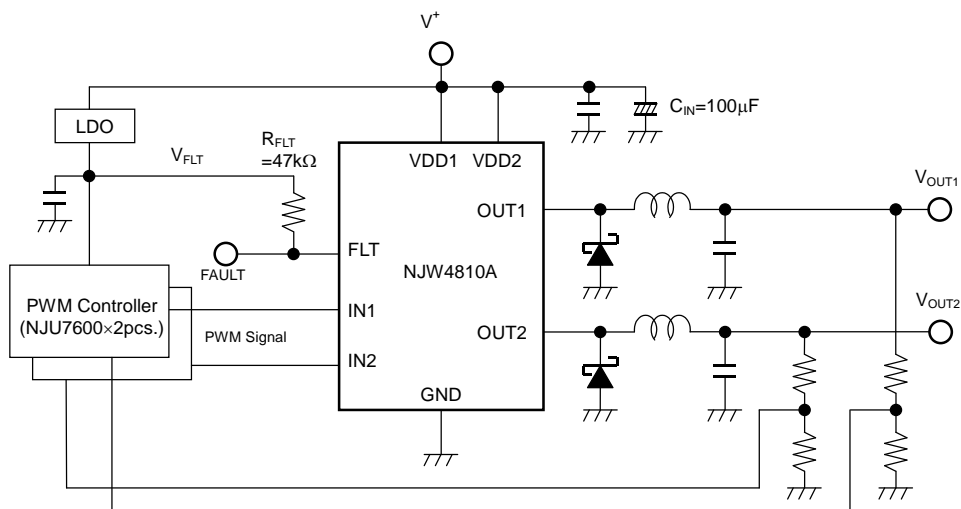


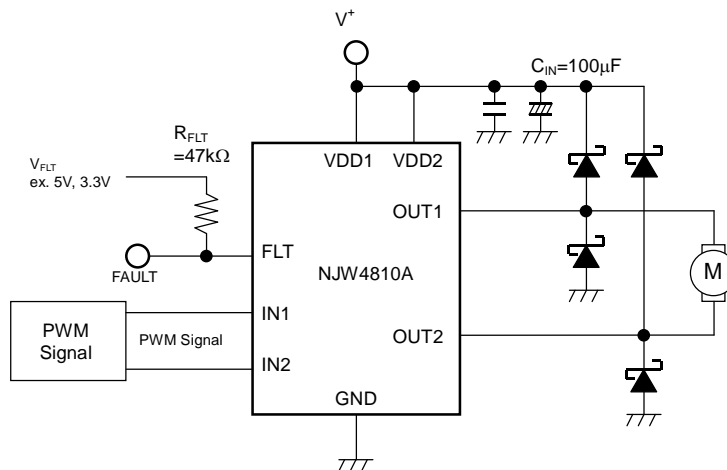
Fig3. SW Operation and Dead Time

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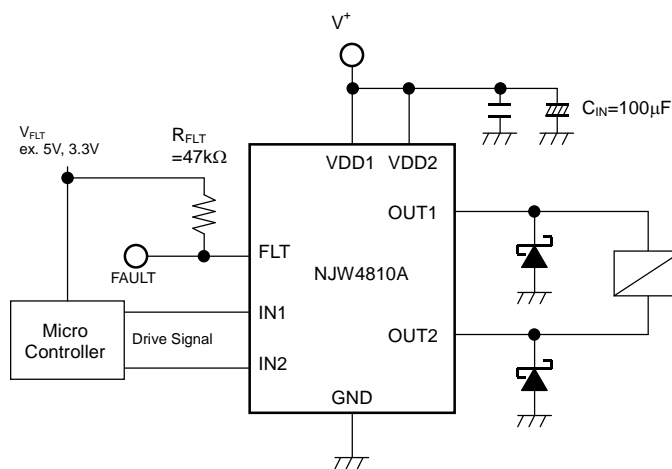
■ TYPICAL APPLICATIONS



2ch Synchronous PWM step down switching regulator

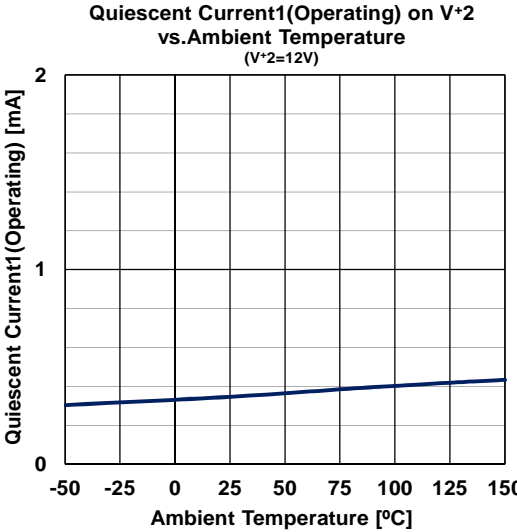
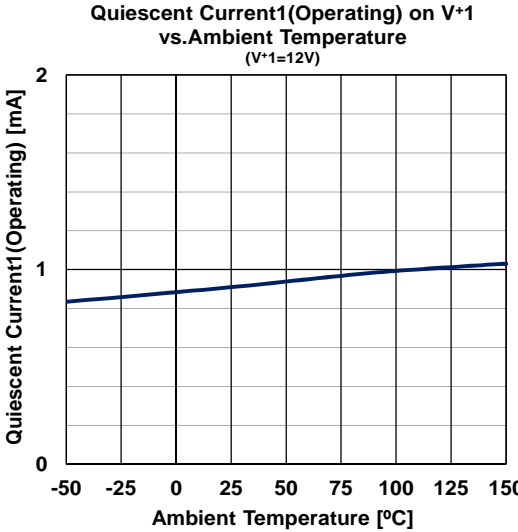
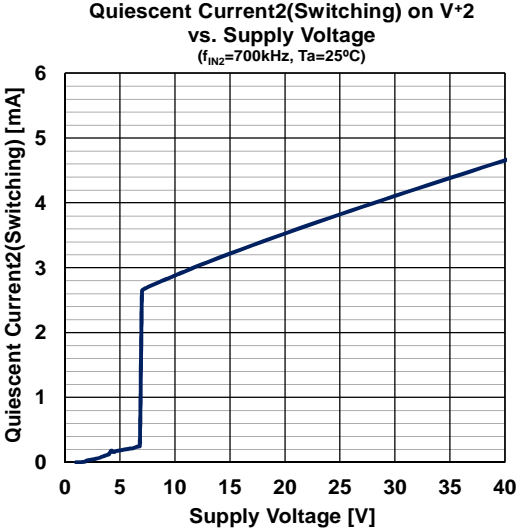
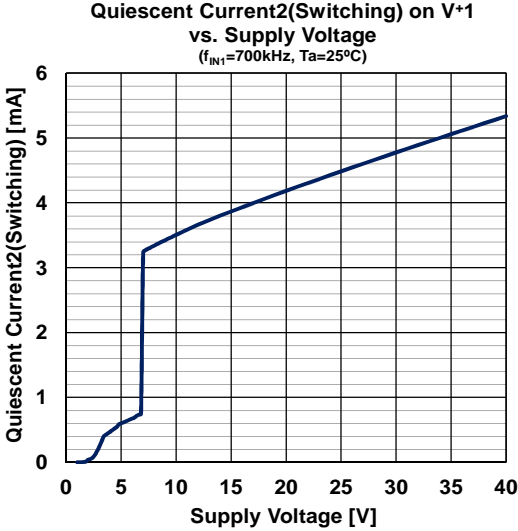
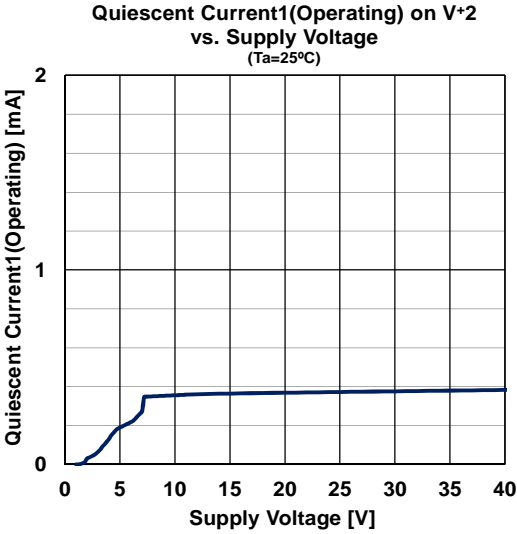
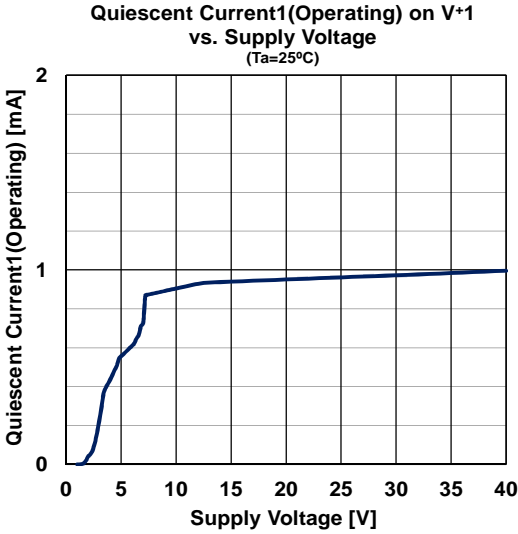


Full bridge motor driver

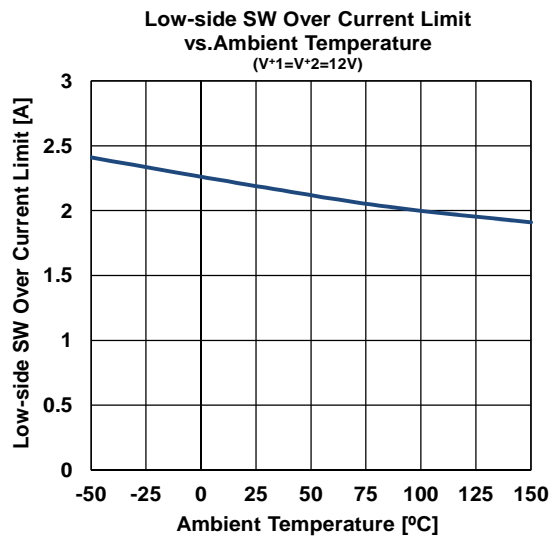
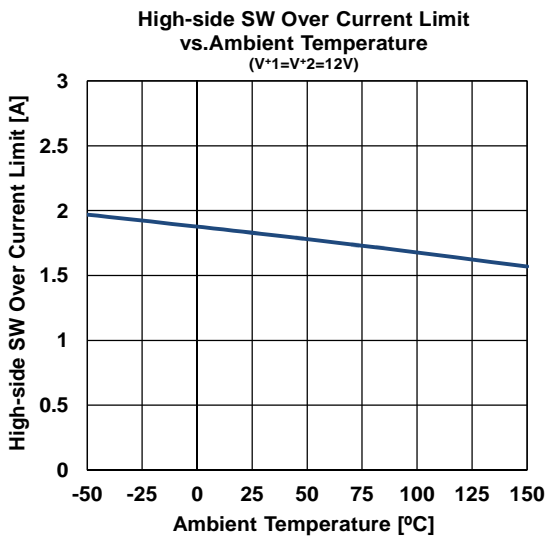
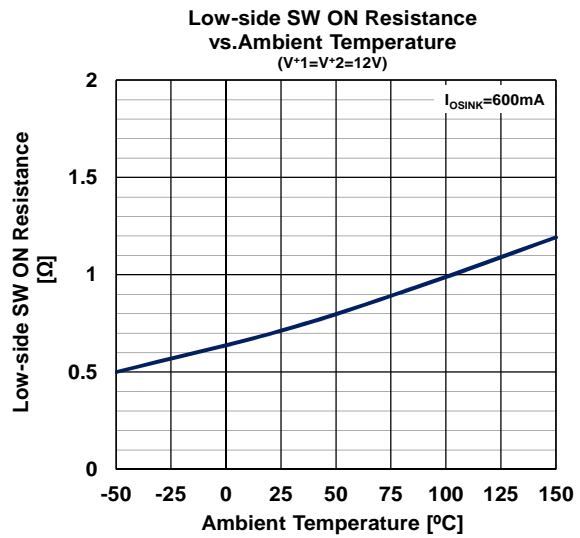
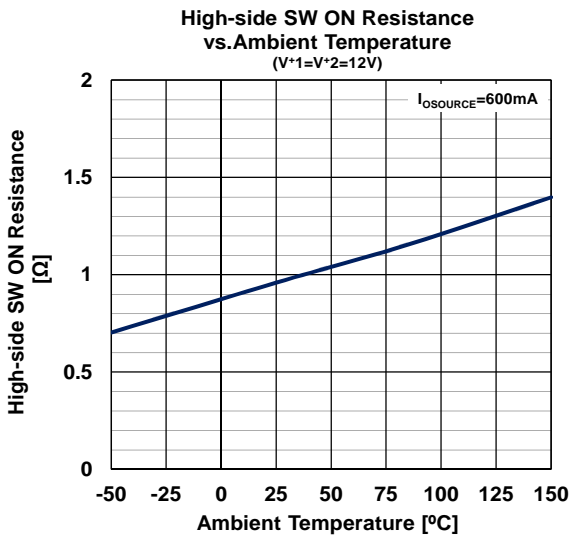
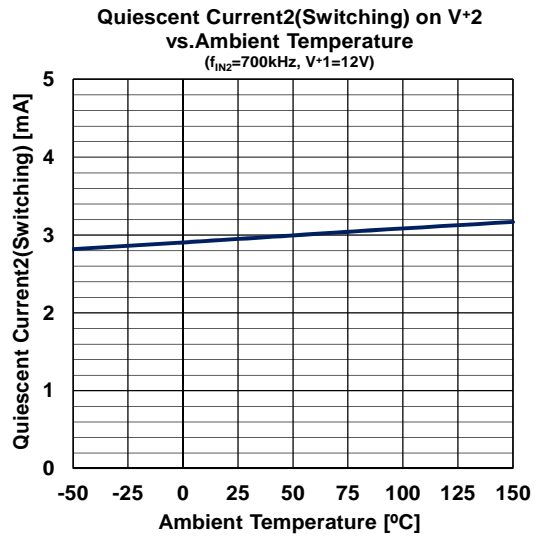
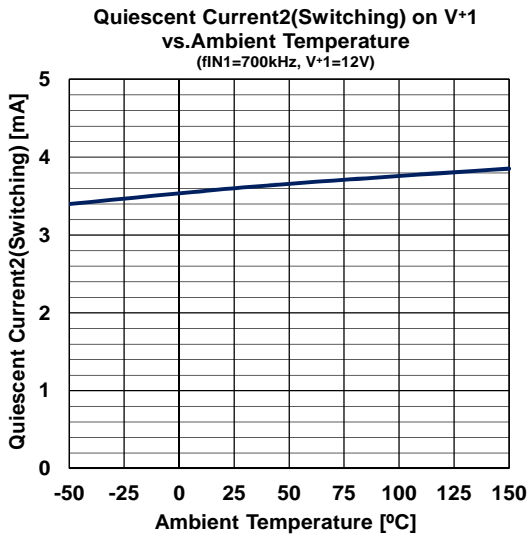


Latch type solenoid driver

■ CHARACTERISTICS

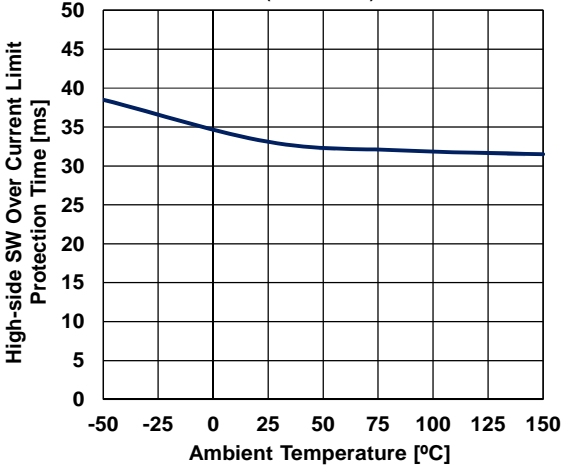


CHARACTERISTICS

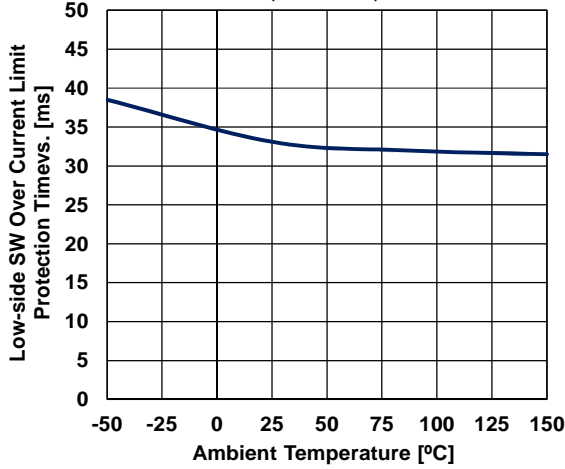


■ CHARACTERISTICS

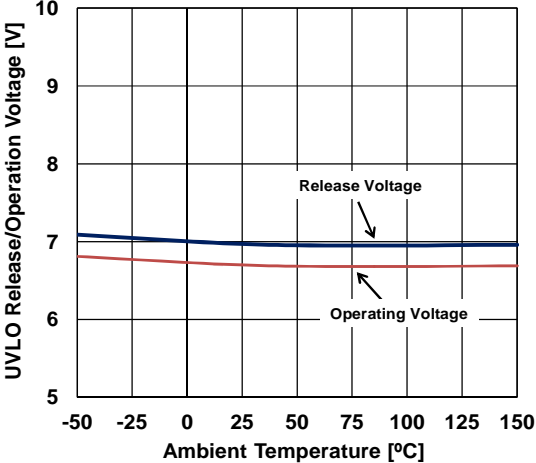
High-side SW Over Current Limit Protection Time vs.Ambient Temperature
(V*1=V*2=12V)



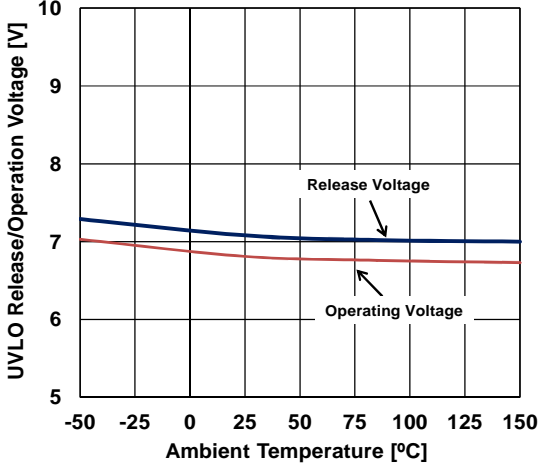
Low-side SW Over Current Limit Protection Time vs.Ambient Temperature
(V*1=V*2=12V)



UVLO Release/Operation Voltage vs.Ambient Temperature
VDD1 side



UVLO Release/Operation Voltage vs.Ambient Temperature
VDD2 side



MEMO

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