PWM TYPE 3-PHASE DC BRUSHLESS MOTOR CONTOROL IC

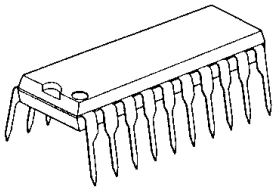
♦ GENERAL DESCRIPTION

The **NJM2625** is a 3-phase DC brush-less motor control IC with PWM control.

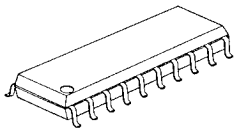
It incorporates hall amplifiers, PWM control circuits, totem-pole pre drivers for external power MOS transistors, current limit and frequency generator circuit.

The NJM2625 easily implements speed control and rotation direction control for DC motor application.

♦ PACKAGE OUTLINE



NJM2625D

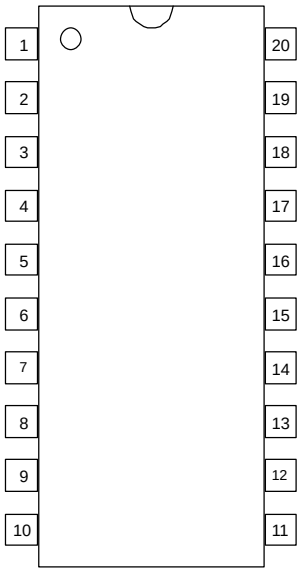


NJM2625M

♦ FEATURES

- Operating Voltage (V^+=8V to 18V)
- Pre-Driver Circuit (Iout=+50mA/-150mA MAX.)
- Current Limit Sense Voltage (Current limit=0.5V±10%)
- Internal Oscillator (Frequency control for external capacitor)
- Forward or Reverse Direction
- FG Signal Output (Output frequency to hall frequency)
- Internal Soft Start (External capacitor to Verr pin.
- Internal ON/OFF Circuit (No-output is Verr pin to GND.)
- Bipolar Technology
- Package Outline DIP20, DMP20

♦ PIN CONFIGRATION

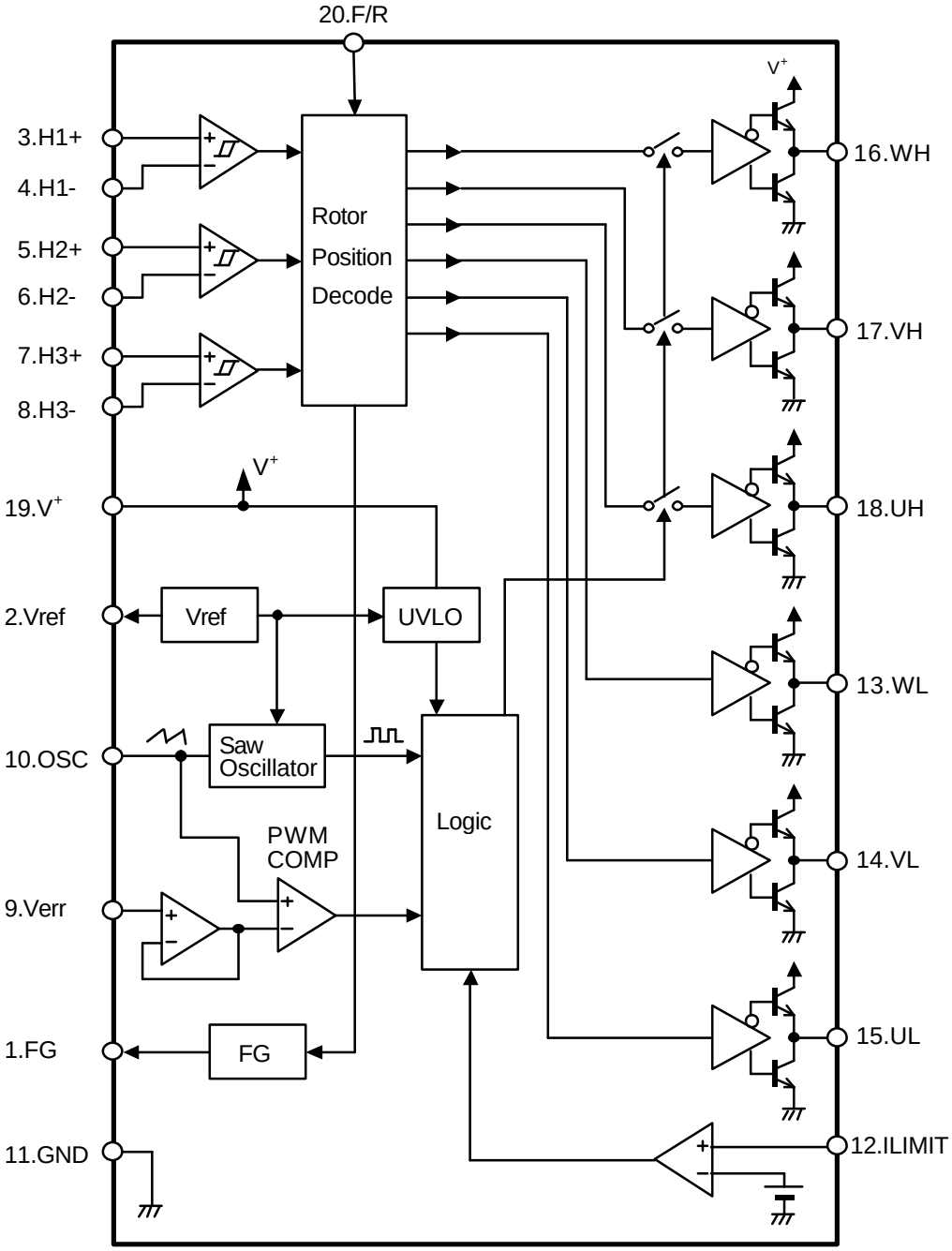


NJM2625D
NJM2625M

PIN FUNCTION

1.FG	11.GND
2.Vref	12.I_{LIMIT}
3.H1+	13.WL
4.H1-	14.VL
5.H2+	15.UL
6.H2-	16.WH
7.H3+	17.VH
8.H3-	18.UH
9.Verr	19.V^+
10.OSC	20.F/R

♦BLOCK DIAGRAM



♦ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Maximum Supply Voltage	V^+	20	V
Power Dissipation	P_D	(DIP20) 700 (DMP20) 350	mW
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-50 ~ +150	°C

♦ELECTRICAL CHARACTERISTICS (V^+=12V, Ct=1000pF, Cref=1µF, Ta=25°C)

Total Device

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V^+		8.0	-	18.0	V
Under Voltage Sense Voltage (Under Voltage Lock Out)	UVLO	Output Enable V^+ Increasing	7.00	7.25	7.50	V
Hysteresis Voltage (Under Voltage Lock Out)	ΔUVLO		0.4	0.5	0.6	V
Supply Current	Icc	RL=∞ PWM Duty=50%	-	15.0	22.0	mA

Hall Sensor Section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Hysteresis Voltage	Vhys	RL=470Ω	-	30	-	mV
Input Common mode Voltage range	Vicm	RL=470Ω	1.5	-	10.5	V
Input Bias Current	IB		-	-	600	nA

Output Section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage 1	Voh	Isource=50mA	10	10.3	-	V
Output Voltage 2	Vol	Isink=150mA	-	1.5	2.0	V

Over Current Sense Section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Sense Voltage	Vth		0.45	0.50	0.55	V
Input Voltage Range	Vip		-	-	3.0	V
Input Bias Current	IIB		-	-0.9	-5.0	µA

Oscillator Section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Oscillation Frequency	fosc		20	25	30	kHz
Oscillate Fluctuations (Line Regulation)	?fosc/?V	V^+=8V to 18V	-	0.01	5.00	%
PWM0% Sense Voltage	PWM0	PWM DUTY=0%	-	-	0.35	V
PWM100% Sense Voltage	PWM1	PWM DUTY=100%	5.40	-	-	V
Saw Wave Peak Voltage	Vpfosc		4.75	5.00	5.25	V
Saw Wave Bottom Voltage	Vbfosc		0.50	0.65	0.80	V

♦ELECTRICAL CHARACTERISTICS (V^+=12V, Ct=1000pF, Cref=1μF, Ta=25°C)

FG Output Section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Saturation Voltage	FGV		-	0.3	0.5	V
Pull-Up Resistance	FGR		8	10	12	kΩ

Error Amplifier Section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	Vio		-	7	-	mV
Input Offset Current	Iio		-	8.0	-	nA
Input Bias Current	Iibrr		-	-46	-	nA
Input Common mode Voltage range	Vicmrr		0	-	Vref	V

Reference Voltage Section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vref	Iref=1.0mA	6.00	6.40	6.80	V
Line Regulation	?VrefLI	V^+=8V to 18V	-	1.5	25	mV
Road Regulation	?VrefLO	Iref=1.0mA to 20.0mA	-	150	250	mV

Forward or Reverse Direction Section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Forward Direction	VF	RL=470Ω	V^+-2	-	V^+	V
Reverse Direction	VR	RL=470Ω	-	-	2	V
Hysteresis Voltage	?VFR	RL=470Ω	-	0.5	-	V

(note) Output switch tests are performed under pulsed conditions to minimize power dissipation.

♦FG Output

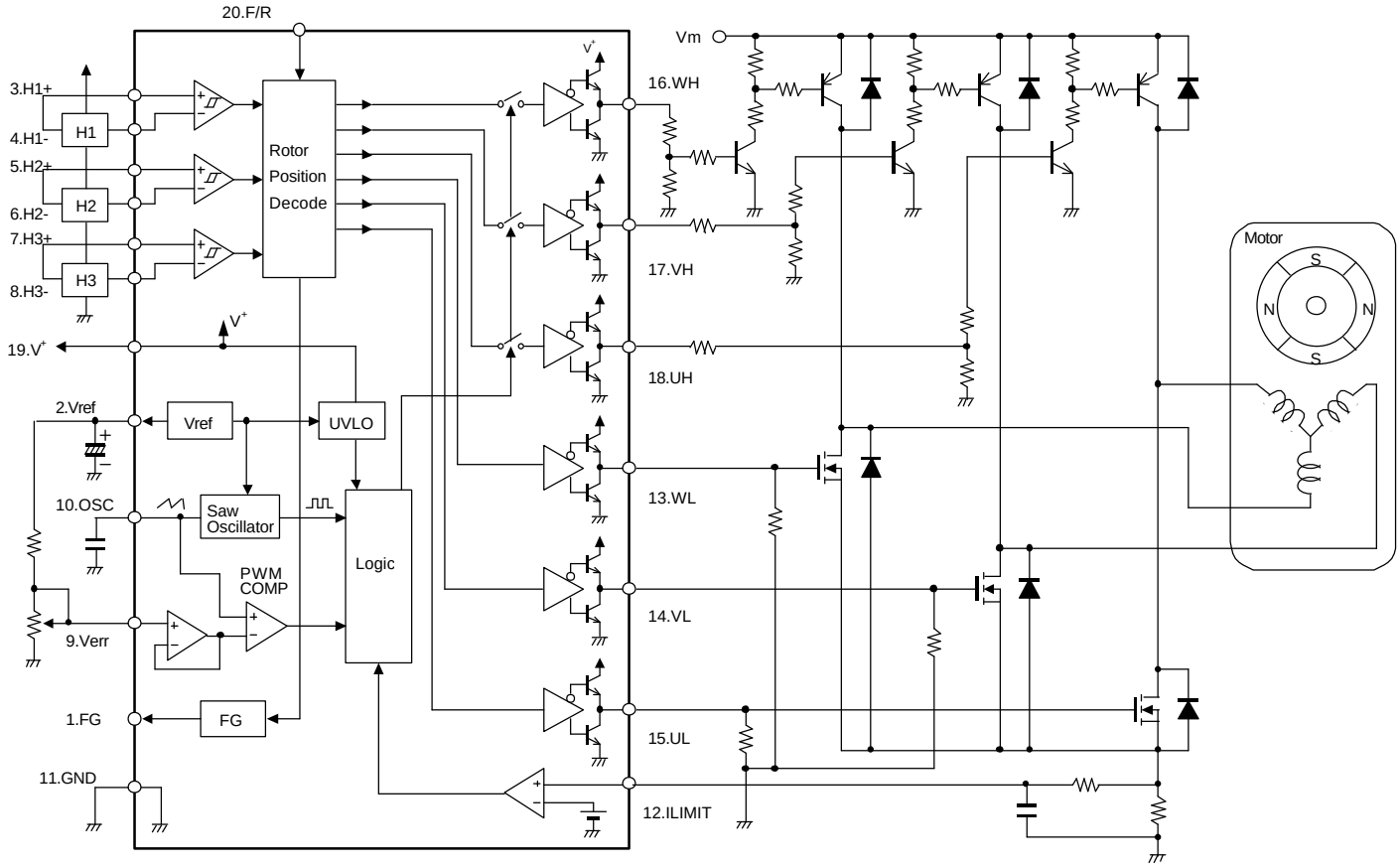
	Input			FG Output
	H1	H2	H3	
1	H	L	H	H
2	H	L	L	L
3	H	H	L	H
4	L	H	L	L
5	L	H	H	H
6	L	L	H	L

♦F/R Input Pin

This pin dose not include neither pull up resistance nor pull down resistance.

Terminal Voltage	Direction
L input	F
H input	R

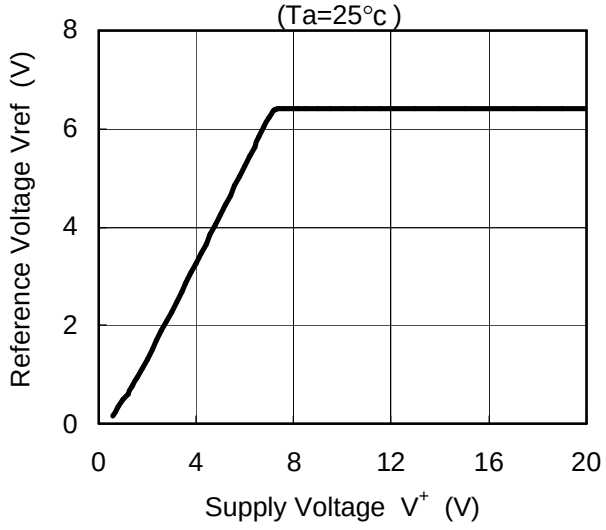
♦TYPICAL APPLICATION



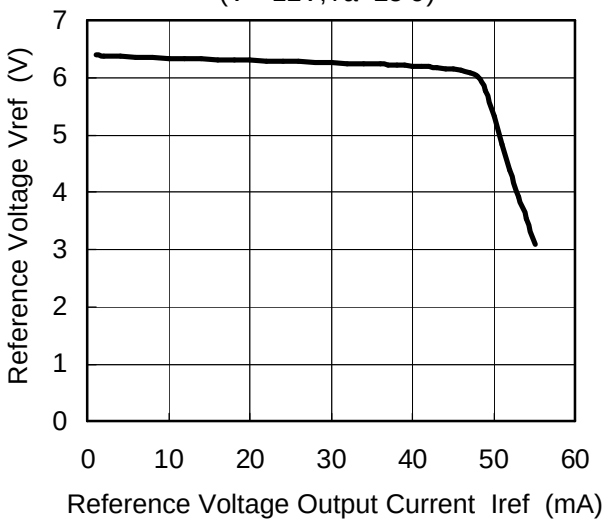
- A rotation direction change must be made after motor stopped completely.
- When PWM duty is extremely small, two or more switching elements cannot be driven entirely. In such case, switching elements will generate excess heat and it may cause destruction of the switching devices. Therefore, extensive heat evaluation is necessary for switching device selection particularly in consideration of the area of safety operation (ASO).

♦TYPICAL CHARACTERISTICS

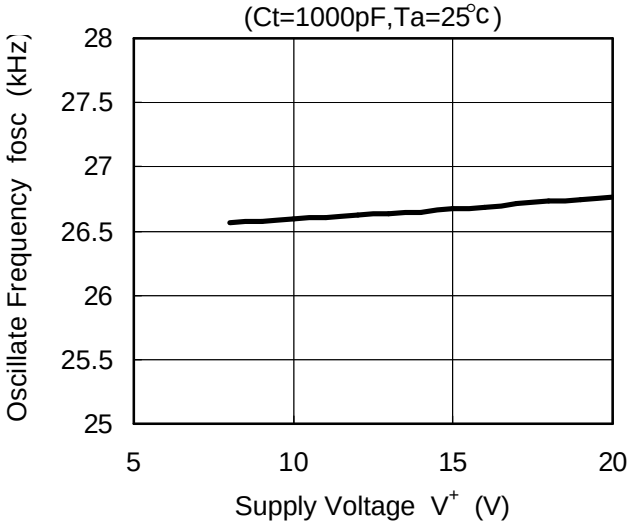
Reference Voltage vs. Supply Voltage
(Ta=25°c)



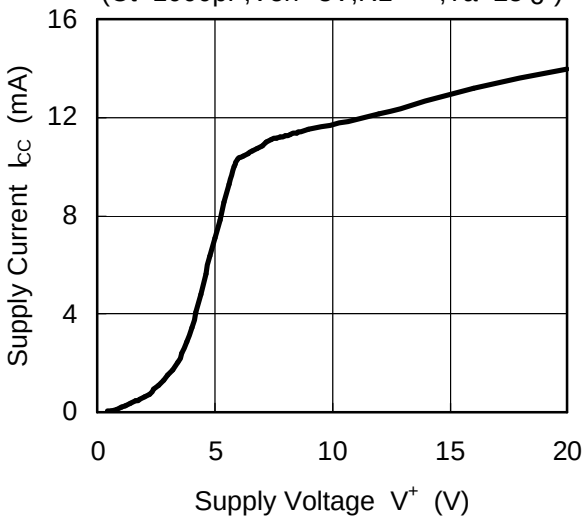
Reference Voltage
vs. Reference Voltage Output Current
(V^+=12V,Ta=25°c)



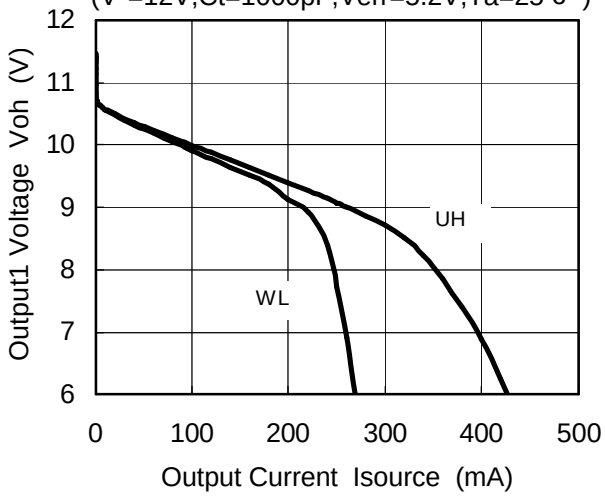
Oscillate Frequency vs. Supply Voltage
(Ct=1000pF,Ta=25°c)



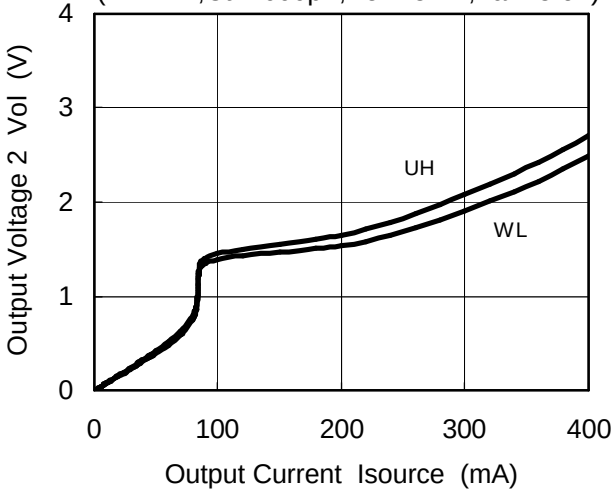
Supply Current vs. Supply Voltage
(Ct=1000pF,Verr=3V,RL=∞ ,Ta=25°c)



Output1 vs. Output Current
(V^+=12V,Ct=1000pF,Verr=5.2V,Ta=25°c)

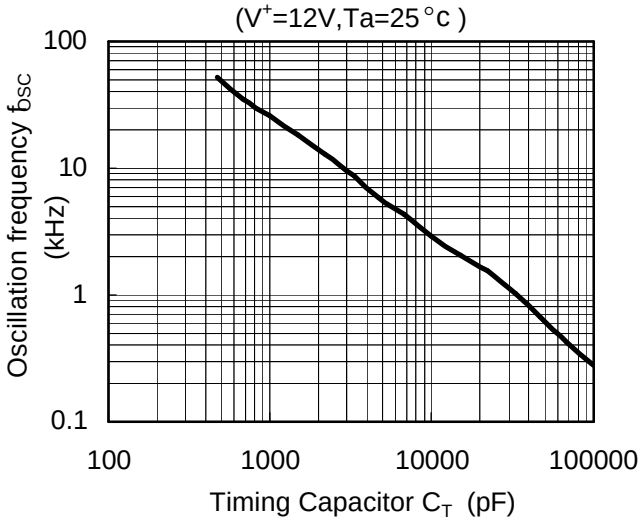


Output Voltage 2 vs. Output Current
(V^+=12V,Ct=1000pF,Verr=5.2V,Ta=25°c)

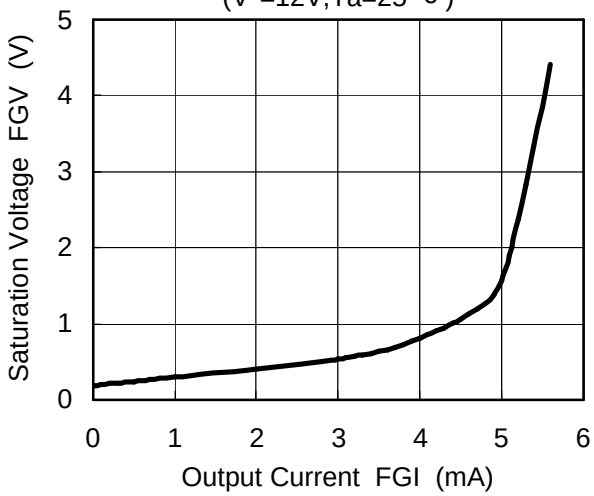


♦TYPICAL CHARACTERISTICS

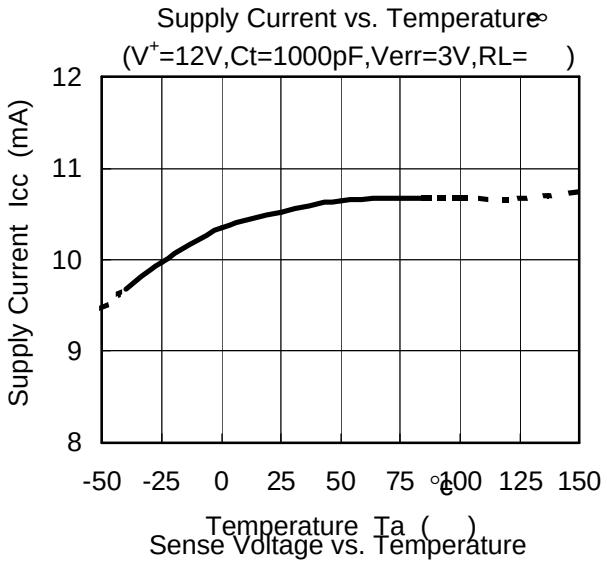
Oscillation frequency vs. Timing Capacitor
(V^+=12V,Ta=25°c)



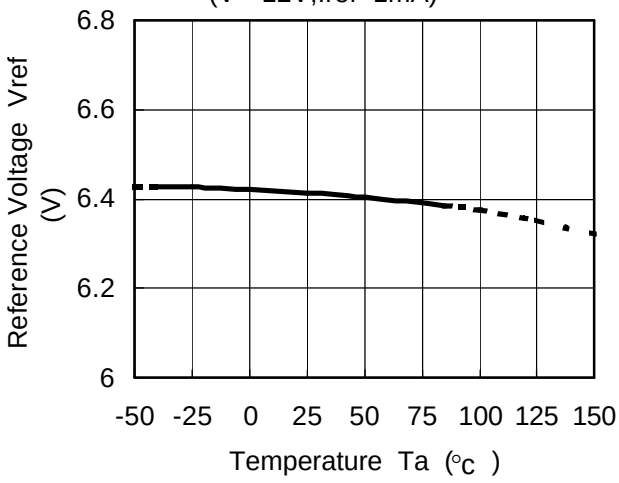
FG Saturation Voltage vs. Output Current
(V^+=12V,Ta=25°c)



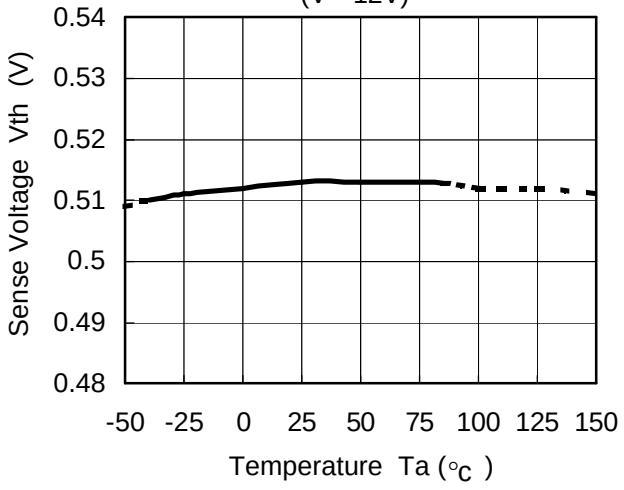
Supply Current vs. Temperature
(V^+=12V,Ct=1000pF,Verr=3V,RL=)



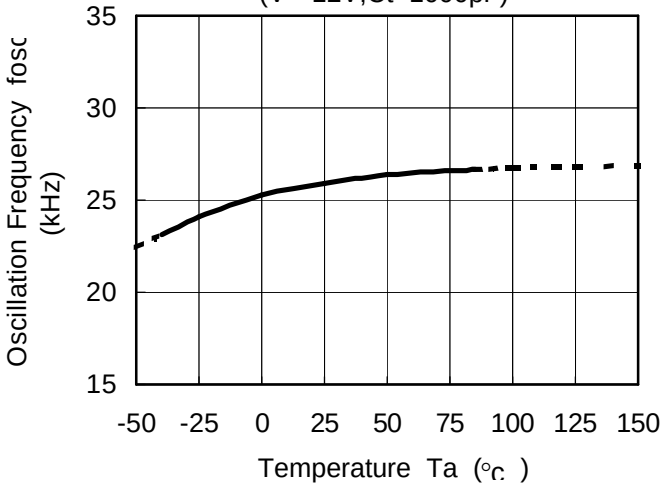
Reference Voltage vs. Temperature
(V^+=12V,Iref=1mA)



Sense Voltage vs. Temperature
(V^+=12V)



Oscillation Frequency vs. Temperature
(V^+=12V,Ct=1000pF)



MEMO