PWM TYPE 3-PHASE DC BRUSHLESS MOTOR CONTROL IC

■ GENERAL DESCRIPTION

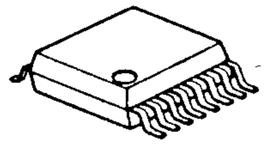
The NJM2626 is a 3-phase DC brush less motor control pre-driver IC with PWM control.

It takes hall IC inputs and generates motor driving waveform.

Output pre-driver is optimized to work with external power MOS transistors for better power handling.

The NJM2626 can easily implement 3-phase DC motor application with speed control feature.

■ PACKAGE OUTLINE

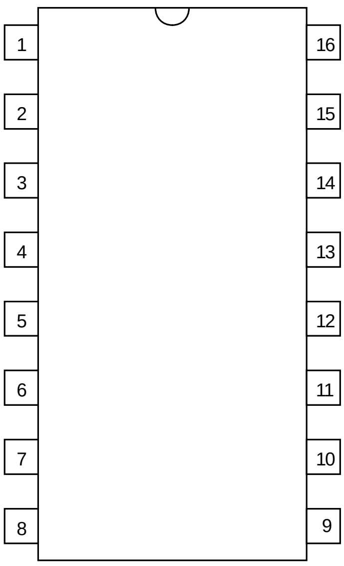


NJM2626V

■ FEATURES

- Operating Voltage 6 to 26V
- Pre-driver circuit
  Lower arm : (Iout=+30mA/-30mA TYP.)
  Upper arm : (Iout=30mA TYP.)
- Current limit sense voltage (Current limit=0.5V±10%)
- Internal Oscillator
  (Frequency control for external capacitor)
- Forward or Reverse direction
- Internal Soft Start (External capacitor to Verr pin)
- Internal ON/OFF Circuit (No-output is Verr pin to GND)
- Bipolar Technology
- Package Outline SSOP16

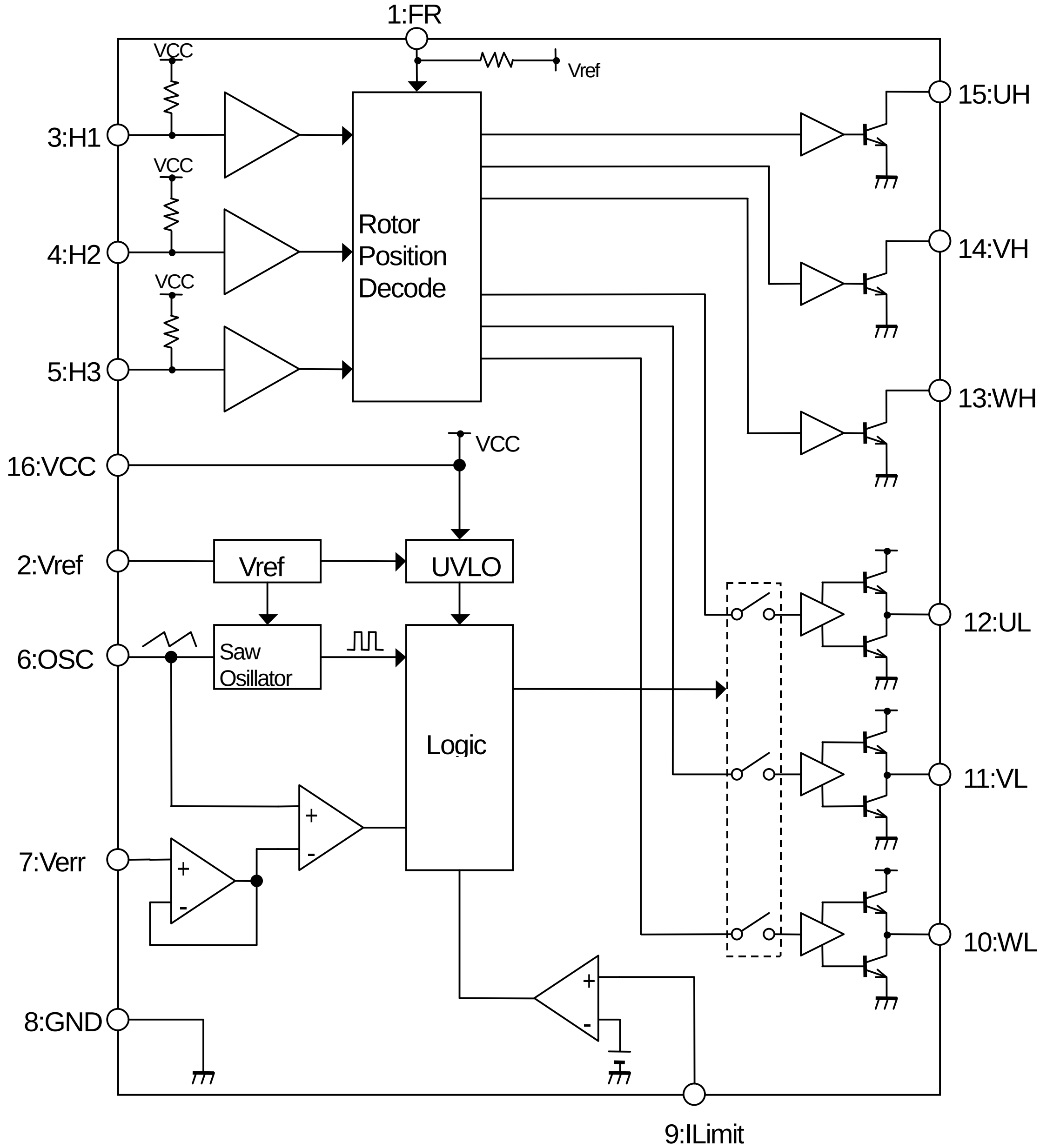
■ PIN CONNECTION



NJM2626V

1.FR	9.Ilimit
2.Vref	10.WL
3.H1	11.VL
4.H2	12.UL
5.H3	13.WH
6.OSC	14.VH
7.Verr	15.UH
8.GND	16.VCC

■BLOCK DIAGRAM



■BABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYNBOL	RATINGS	UNIT
Maximum Supply Voltage	V_{CC}	28	V
Maximum Output Current	Io_{MAX}	40	mA
Power Dissipation	P_D	300 (Device itself) 640 (NOTE1)	mW
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature range	Tstg	-50 ~ +150	°C

NOTE1 : EIA/JEDEC STANDARD Test board (76.2*114.3*1.6mm, 2layers, FR-4) mounting

■ELECTRICAL CHARACTERISTICS (V_{CC}=12V, Ct=1000pF, Cref=1µF, Ta=25°C)

Total Device

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operation Supply Voltage	V_{CC}	-	6.0	-	26.0	V
Under Voltage Sense Voltage	UVLO	Output Enable V_{CC} Decreasing	4.5	5.0	5.5	V
Hysteresis Voltage (Under Voltage Lock Out)	ΔUVLO	-	0.35	0.45	0.55	V
Supply Current	I_{CC}	RL=∞	-	12.0	18.0	mA

Reference Voltage Section

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Reference Voltage Output	Vref	Iref=1.0mA	3.6	4.0	4.4	V
Line Regulation	$\Delta Vref_{LI}$	V_{CC}=6V ~ 18V	-	50	100	mV
Load Regurlationj	$\Delta Vref_{LO}$	Iref=1.0mA ~ 20.0mA	-	15	50	mV

Hall Amplifier Section

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input H Level Voltage	V_{hH}	-	V_{CC}-0.8	-	-	V
Input L Level Voltage	V_{hL}	-	-	-	0.8	V
Input Bias Voltage	I_{ho}	Vin=0.8V	-	-	-400	nA
Pull-up Resistance	R_{PUH}	Vin=0.8V	7	10	13	kΩ

Output Section

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Under Arm Output Voltage 1	V_{OH}(D)	Isource=30mA	10	10.3	-	V
Under Arm Output Voltage 2	V_{OL}(D)	Isink=30mA	-	0.5	1.0	V
Output Clamp Voltage	V_{CL}(D)	V_{CC}=26V	-	18	20	V
Upper Arm Output Voltage	V_{OL}(U)	Isink=30mA	-	0.5	1.0	V
Output Leak Current	Io_{LEAK}	-	-	-	1.0	uA

■ELECTRICAL CHARACTERISTICS (V_{CC}=12V, Ct=1000pF, Cref=1µF, Ta=25°C)

Over Current Sense Section

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Sense Voltage	V_{TH}	-	0.45	0.50	0.55	V
Hysteresis Voltage	V_{THhys}	-	-	0.1	-	V
Input Voltage Ratio	V_{IN}	-	-	-	3.0	V
Input Bias Current	I_{IB}	V_{IN}=0V	-	-0.9	-5.0	µA

Oscillator Section

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Oscillator Frequency	f_{osc}	-	22	27	33	kHz
Supply Voltage Change Ratio	$\Delta f_{osc}/\Delta V$	V_{CC}=6V ~ 18V	-	1	5	%
PWM0% Sense Voltage	PWM0	PWM DUTY=0%	-	-	0.35	V
PWM100% Sense Voltage	PWM1	PWM DUTY=100%	3.5	-	-	V
Saw Wave Peak Voltage	Vp_{fosc}	-	2.4	2.8	3.2	V
Saw Wave Bottom Vltaeg	Vb_{fosc}	-	0.75	0.9	1.05	V

Error Amplifier Section

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	-	-	7	-	mV
Input Bias Current	I_{IBRR}	-	-	-46	-	nA
Input Common Mode Voltage Range	V_{ICMRR}	-	0	-	Vref	V

Forward or Reverse Direction Section (FR input terminal)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Forward Direction	V_F	-	Vref-0.8	-	Vref	V
Output Reverse Direction	V_R	-	-	-	0.8	V
Hysteresis Voltage Ratio	ΔV_{FR}	-	-	0.5	-	V
Pull-Up Resistance	RPU_{FR}	-	7	10	13	kΩ

(note) Output swich test are performed under pulsed conditions to minimize power dissipation.

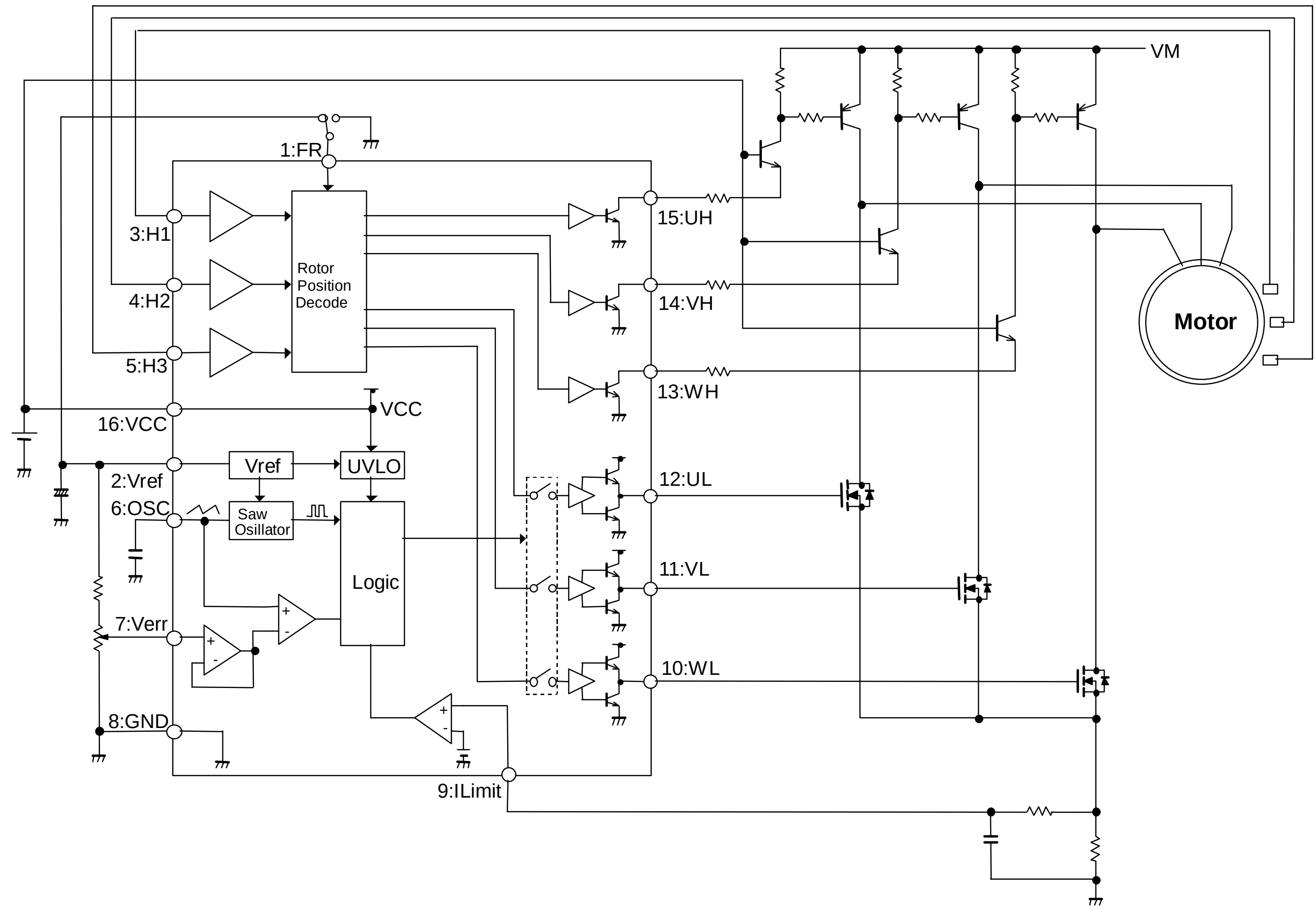
■HALL INPUT vs HALL OUTPUT TRUTH TABLE

FR=L			FR=H			H:Source,L:Sink,X:Hi-Z					
H1	H2	H3	H1	H2	H3	UH	VH	WH	UL	VL	WL
H	L	H	L	H	L	X	L	X	H	L	L
H	L	L	L	H	H	X	X	L	H	L	L
H	H	L	L	L	H	X	X	L	L	H	L
L	H	L	H	L	H	L	X	X	L	H	L
L	H	H	H	L	L	L	X	X	L	L	H
L	L	H	H	H	L	X	L	X	L	L	H

■FR INPUT TERMINAL

Terminal Voltage	Direction
L input	F
H input	R

■ TYPICAL APPLICATION

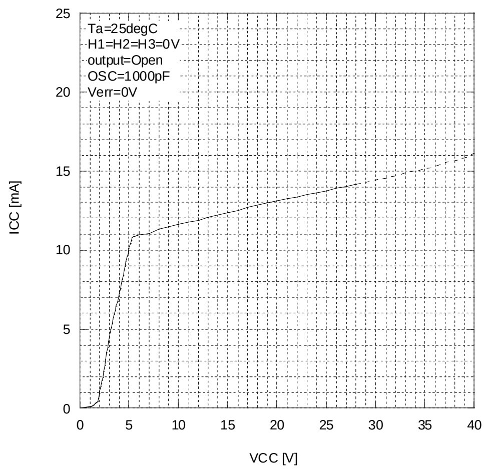


• A rotation direction change must be made after motor stopped completely.

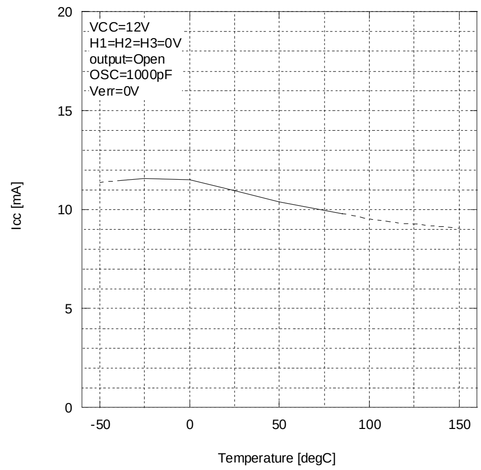
• When PWM duty is extremely small, two or more switching elements can not be driven entirely. In such case, switching elements will generate excess heat and it may cause destruction of the switching devices. Therefore, extensive heat evaluation is necessary for switching device selection particularly in consideration of the area of safety operation (ASO).

■TYPICAL CHARACTERISTICS

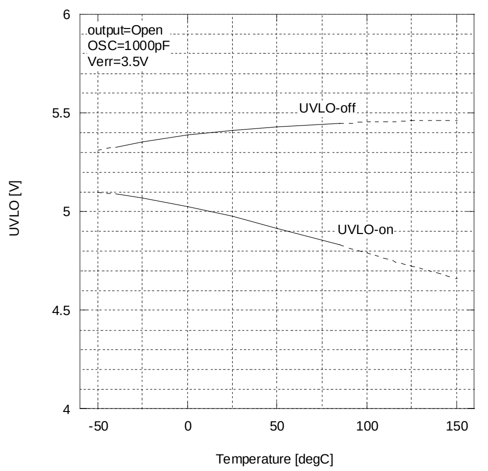
ICC vs. VCC



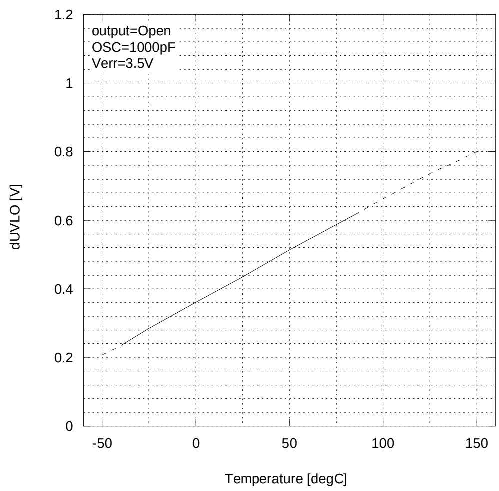
ICC vs. Temperature



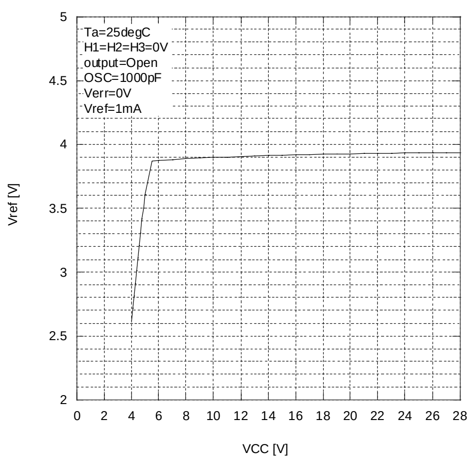
UVLO vs. Temperature



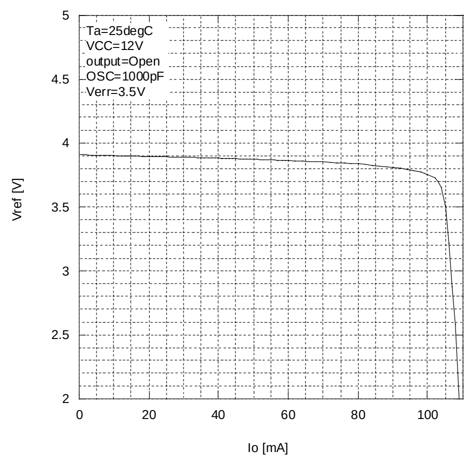
dUVLO vs. Temperature



Vref vs. VCC

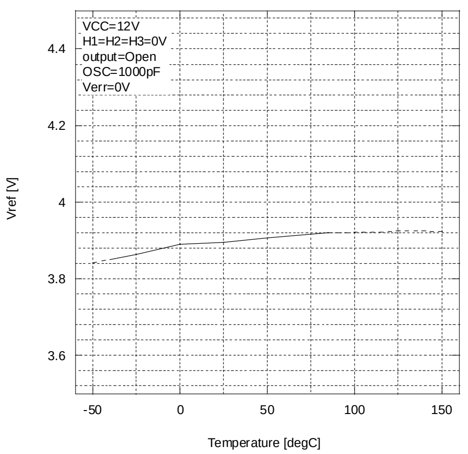


Vref vs. Io

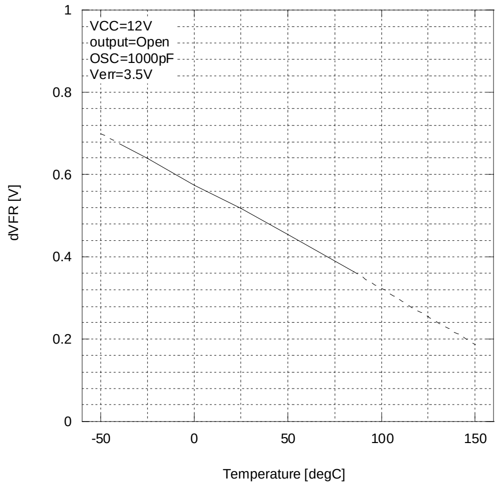


■TYPICAL CHARACTERISTICS

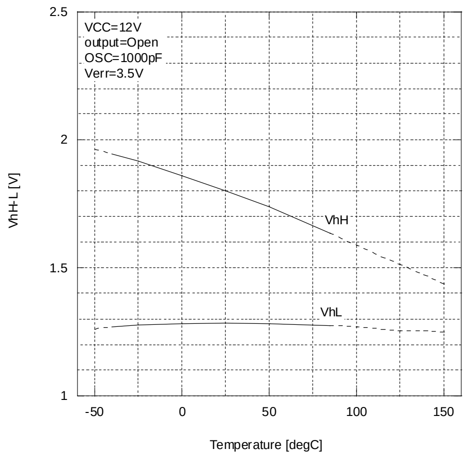
Vref vs. Temperature



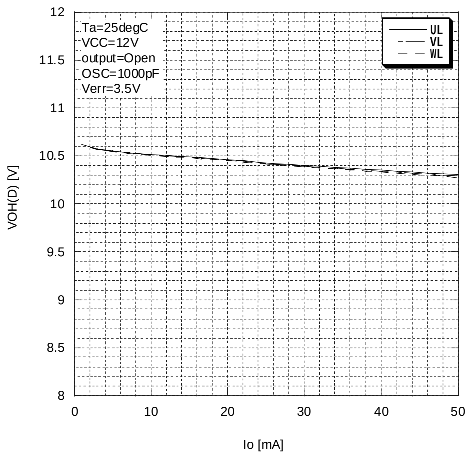
dVFR vs. Temperature



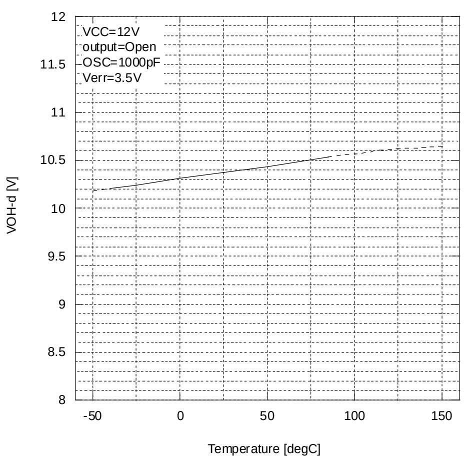
VhH-L vs. Temperature



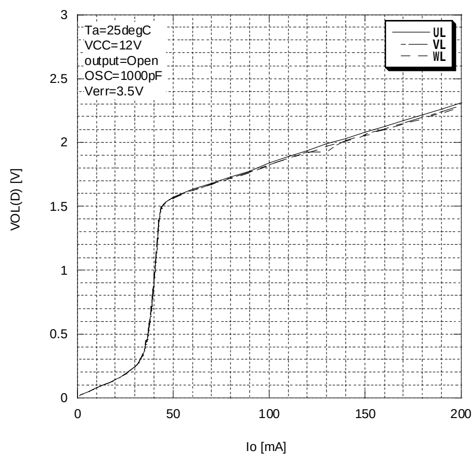
VOH(D) vs. Io



VOH-d vs. Temperature

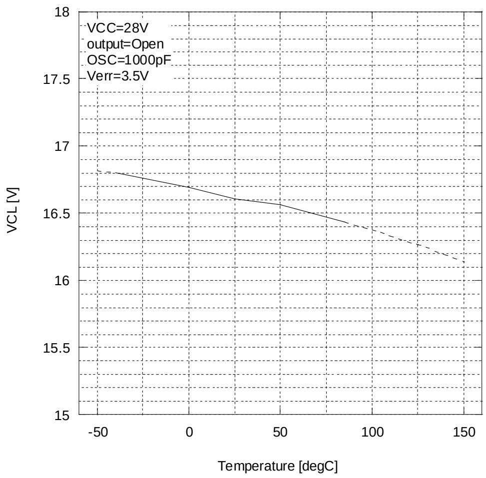


VOL(D) vs. Io

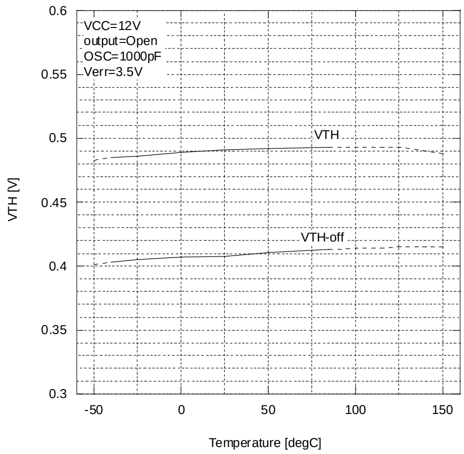


■TYPICAL CHARACTERISTICS

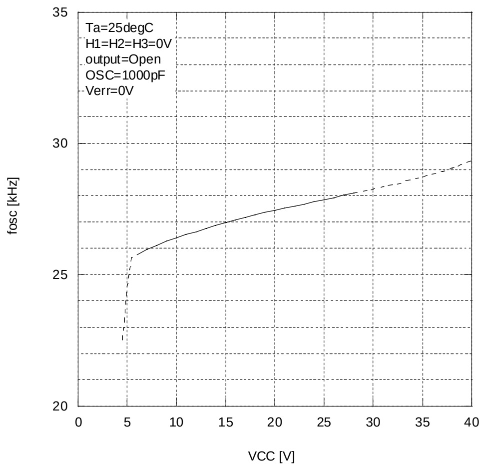
VCL vs. Temperature



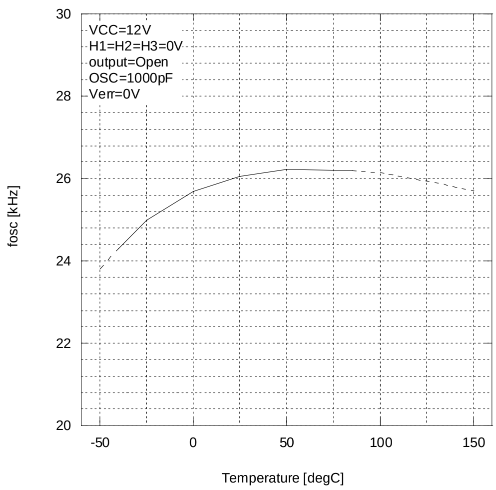
VTH vs. Temperature



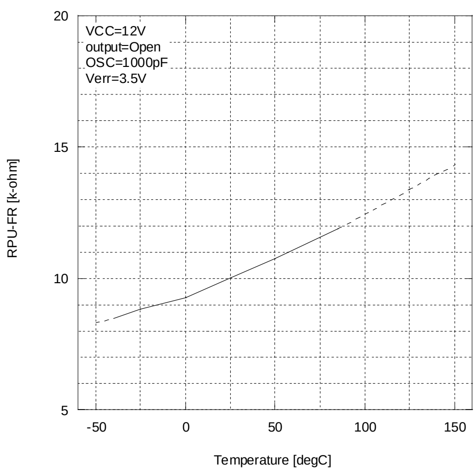
fosc vs. VCC



fosc vs. Temperature



RPU-FR vs. Temperature



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