

PWM CONTROL BOOST / FLYBACK SWITCHING REGULATOR IC

■GENERAL DESCRIPTION

NJU7600 is a high speed low voltage operation switching regulator control IC. It features a totem pole driver that can directly drive an external MOS-FET.

Internal soft-start function, Dead time control and timer latch function are included, requiring no external components. All parameters can be optimized by additional external components for design flexibility.

■PACKAGE OUTLINE



NJU7600M

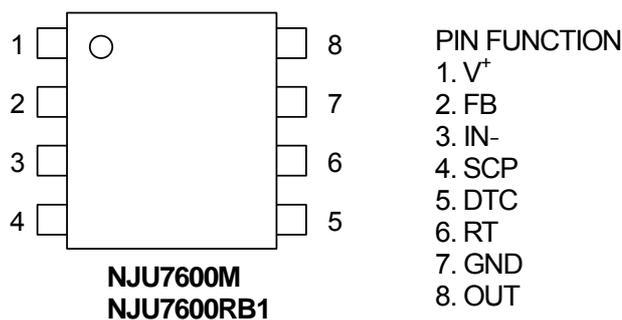


NJU7600RB1

■FEATURES

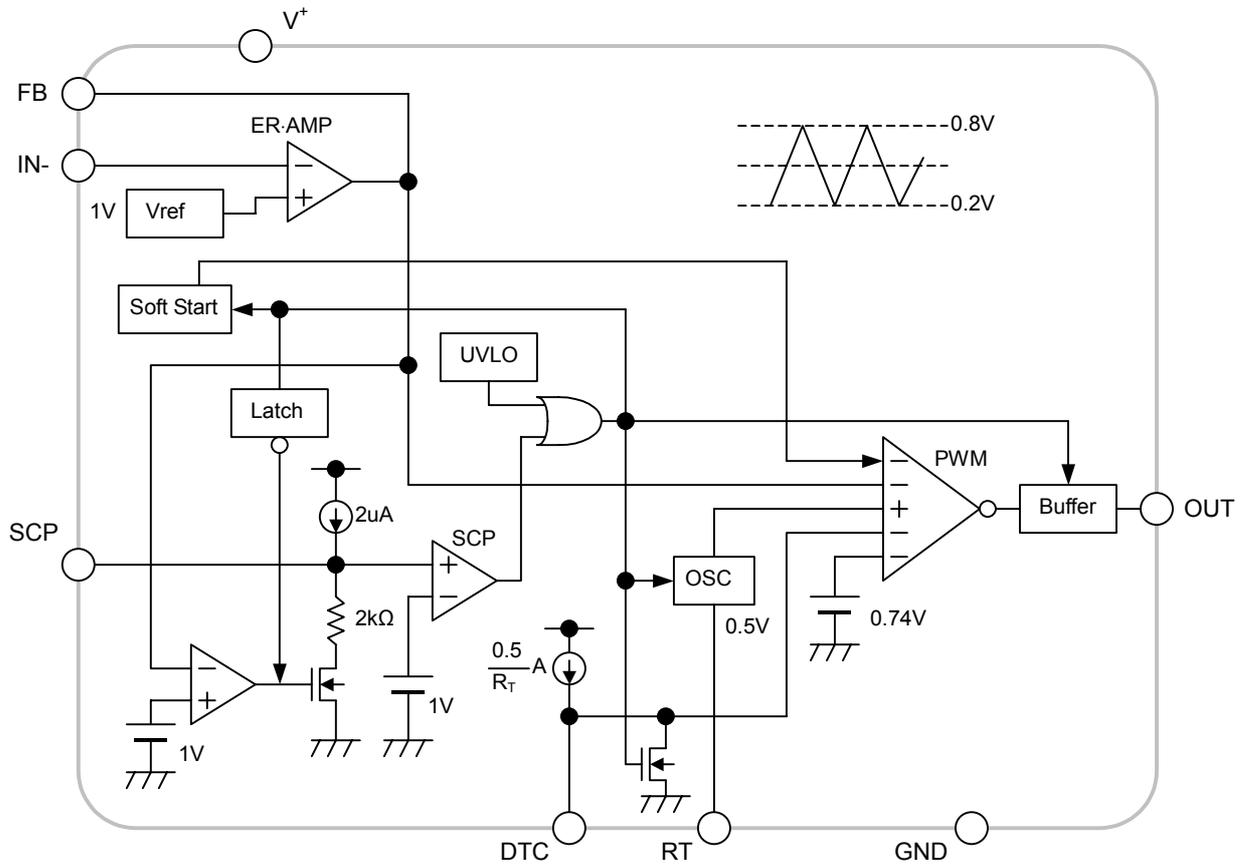
- PWM switching control
- Operating Voltage 2.2V to 8V
- Wide Oscillator Range 300kHz to 1MHz
- Maximum Duty Cycle 90% typ.
- Quiescent Current 800uA typ.
- Soft-Start Function Internal : 16ms typ. or adjustable
- Dead Time Control
- Timer Latch for Short Circuit Protection
- C-MOS Technology
- Package Outline DMP8, TVSP8

■PIN CONFIGURATION



NJU7600

■BLOCK DIAGRAM



■ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Supply Voltage	V^+	+9	V
Output Pin Current	I_O	±50	mA
Power Dissipation	P_D	DMP8 :300 TVSP8 :320	mW
Operating Temperature Range	T_{OPR}	-40 ~ +85	°C
Storage Temperature Range	T_{STG}	-40 ~ +125	°C

■RECOMMENDED OPERATING CONDITIONS (Ta=25°C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V^+	2.2	—	8	V
Oscillator Timing Resistor	R_T	30	47	120	kΩ
Oscillation Frequency	f_{OSC}	300	700	1,000	kHz

■ELECTRICAL CHARACTERISTICS ($V^+=3.3V$, $R_T=47k\Omega$, $T_a=25^\circ C$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Under Voltage Lockout Block						
ON Threshold Voltage	V_{T_ON}	$V^+ = L \rightarrow H$	1.9	2.0	2.1	V
OFF Threshold Voltage	V_{T_OFF}	$V^+ = H \rightarrow L$	1.8	1.9	2.0	V
Hysteresis Voltage	V_{HYS}		60	100	—	mV
Soft Start Block						
Soft Start Time	T_{SS}	$V_{T_ON} \rightarrow$ Duty=80%	8	16	24	ms
Short Circuit Protection Block						
Input Threshold Voltage	V_{T_PC}	FB Pin	0.95	1.00	1.05	V
Charge Current	I_{CHG}	$V_{SCP}=0V$	1.5	2	2.5	μA
Latch Mode ON Threshold Voltage	V_{T_LA}	SCP Pin	0.95	1.00	1.05	V
Latch Mode OFF Threshold Voltage	V_{T_LAOFF}	SCP Pin	0.2	0.45	0.7	V
Oscillator Block						
RT Pin Voltage	V_{RT}		-5%	0.5	+5%	V
Oscillation Frequency	f_{OSC}		630	700	770	kHz
Oscillate Supply Voltage Fluctuations	f_{DV}	$V^+=2.2V \sim 8V$	—	1	—	%
Oscillate Temperature Fluctuations	f_{DT}	$T_a=-40^\circ C \sim +85^\circ C$	—	3	—	%

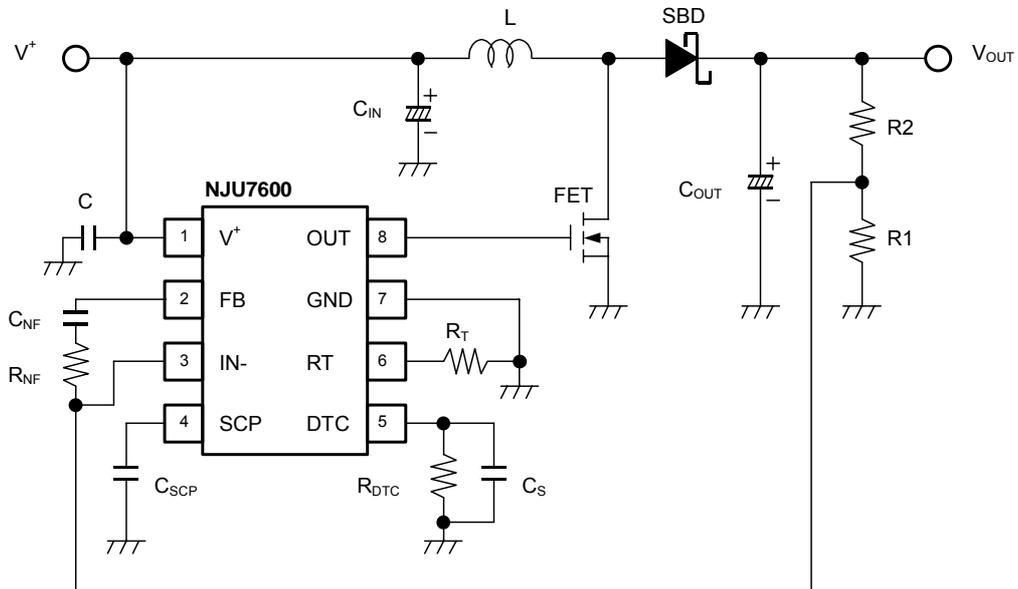
NJU7600

■ELECTRICAL CHARACTERISTICS ($V^+=3.3V$, $R_T=47k\Omega$, $T_a=25^\circ C$)

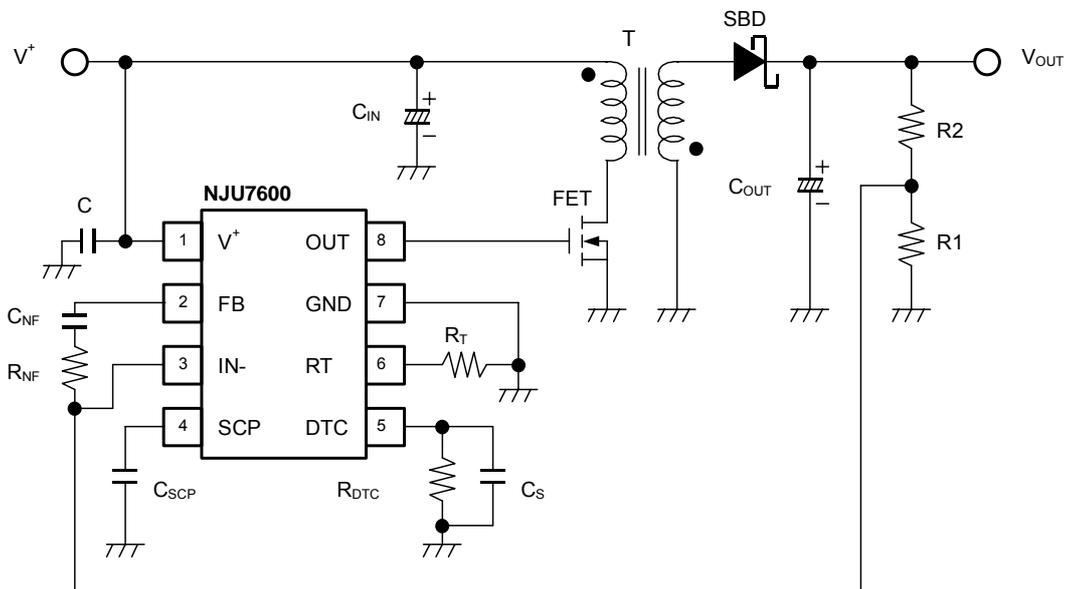
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Error Amplifier Block						
Reference Voltage	V_B		-1.5%	1.00	+1.5%	V
Input Bias Current	I_B		-0.1	–	0.1	μA
Open Loop Gain	A_V		–	80	–	dB
Gain Bandwidth Product	G_B		–	1	–	MHz
Output Source Current	I_{OM+1}	$V_{FB}=1V$, $V_{IN-}=0.9V$	25	55	95	mA
	I_{OM+2}	$V_{FB}=1V$, $V_{IN-}=0.9V$, $V^+=2.2V$	4	9	16	mA
Output Sink Current	I_{OM-}	$V_{FB}=1V$, $V_{IN-}=1.1V$	0.10	0.16	0.22	mA
PWM Compare Block						
Input Threshold Voltage	V_{T0}	Duty=0%	0.16	0.22	0.28	V
	V_{T50}	Duty=50%	0.44	0.5	0.56	V
Maximum Duty Cycle	$M_{AX}D_{UTY1}$	$V_{FB}=0.9V$	85	90	95	%
	$M_{AX}D_{UTY2}$	$V_{FB}=0.9V$, $R_{DTC}=47k\Omega$	40	50	60	%
Output Block						
Output High Level ON Resistance	R_{OH}	$I_O=-20mA$	–	10	20	Ω
Output Low Level ON Resistance	R_{OL}	$I_O=+20mA$	–	5	10	Ω
General Characteristics						
Quiescent Current	I_{DD}	$R_L=Non\ Load$	–	800	1200	μA

■ TYPICAL APPLICATIONS

Boost Converter

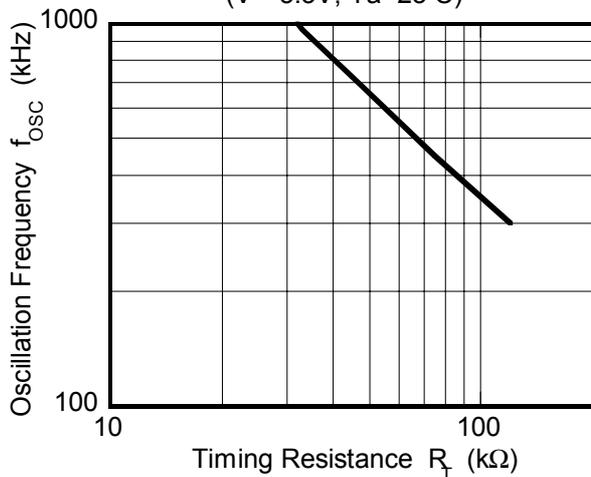


Flyback Converter

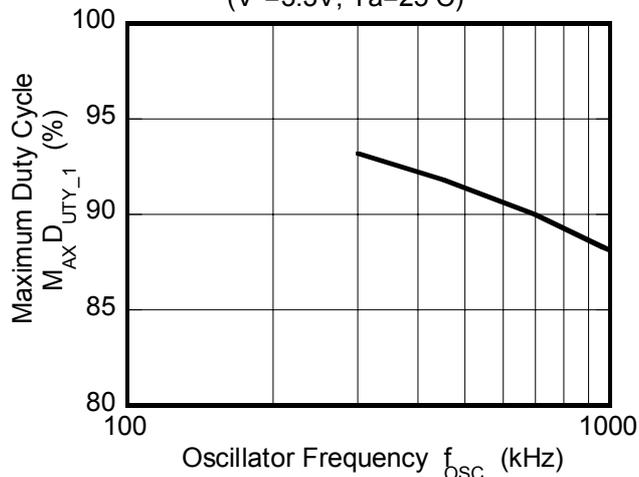


■ TYPICAL CHARACTERISTICS

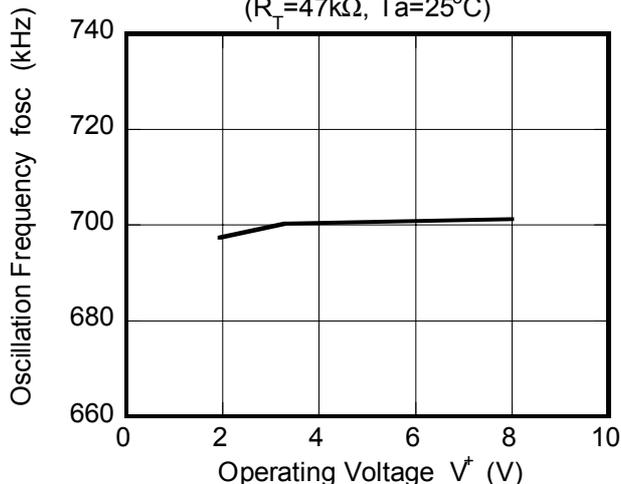
Oscillation Frequency vs. Timing Resistance
($V^+ = 3.3V, T_a = 25^\circ C$)



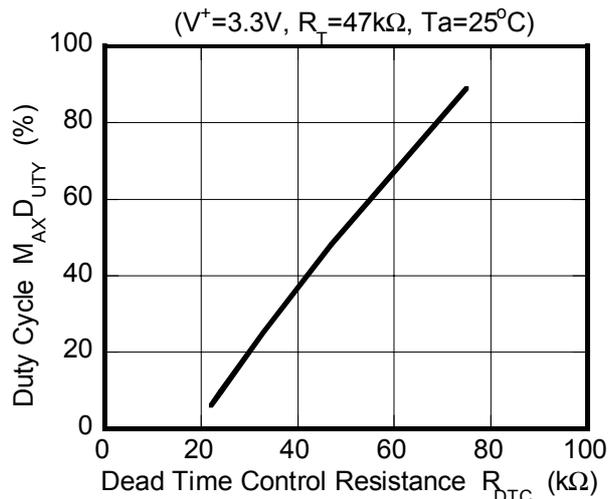
Maximum Duty Cycle vs. Oscillator Frequency
($V^+ = 3.3V, T_a = 25^\circ C$)



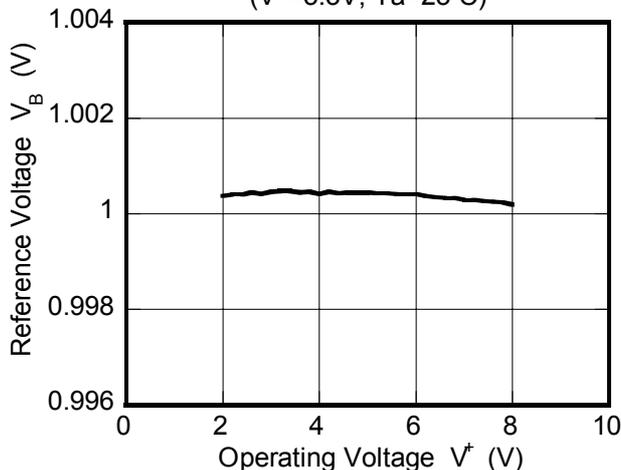
Oscillation Frequency vs. Operating Voltage
($R_T = 47k\Omega, T_a = 25^\circ C$)



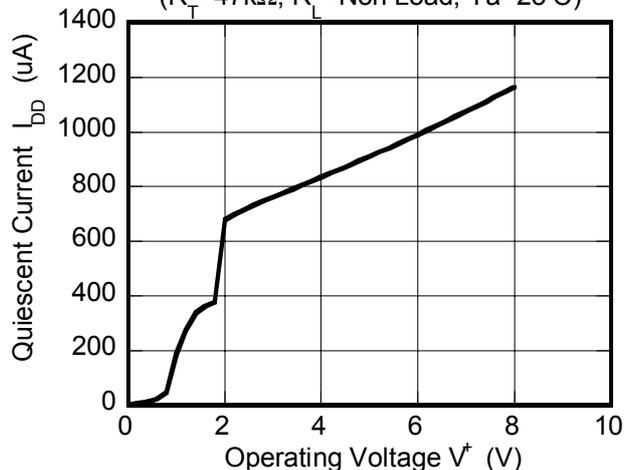
Duty Cycle vs. R_{DTC}



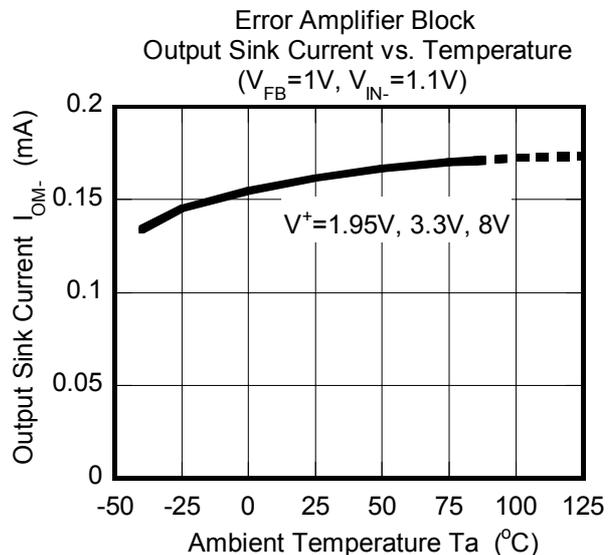
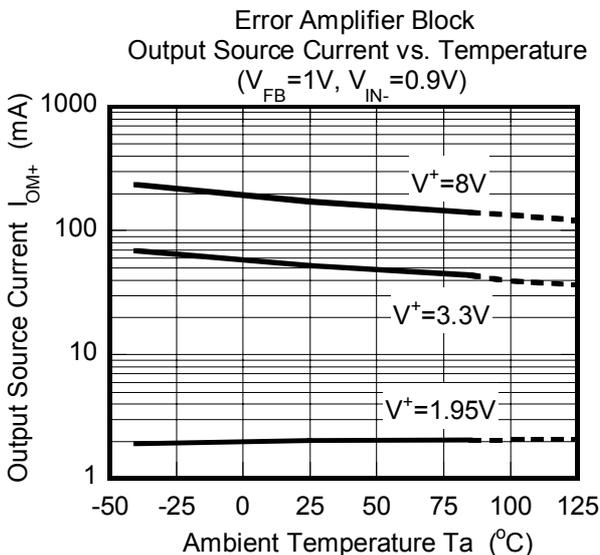
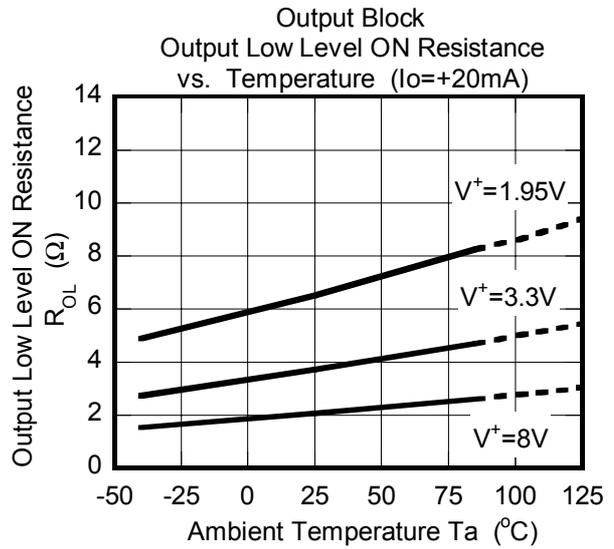
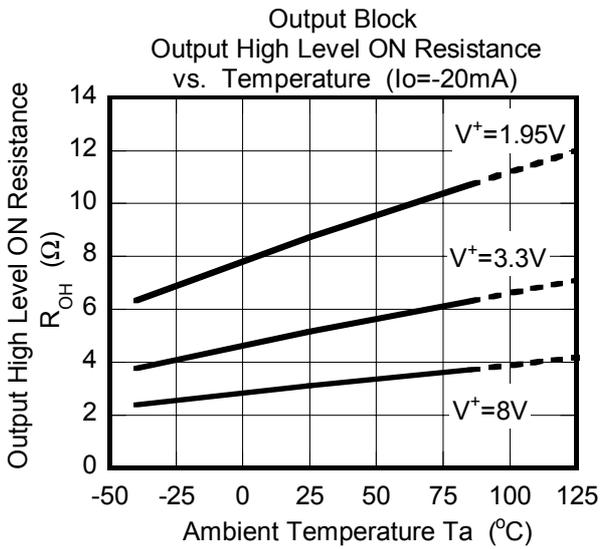
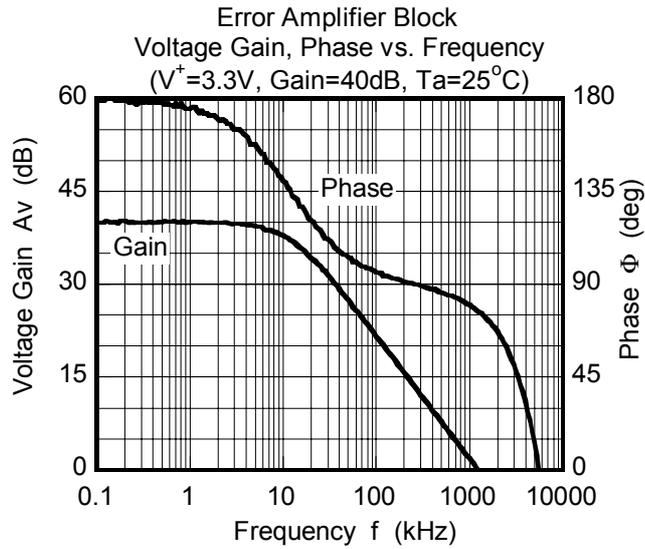
Reference Voltage vs. Operating Voltage
($V^+ = 3.3V, T_a = 25^\circ C$)



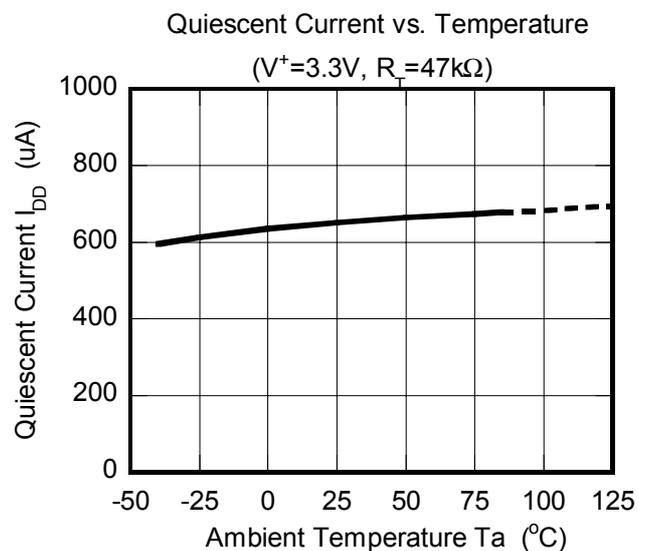
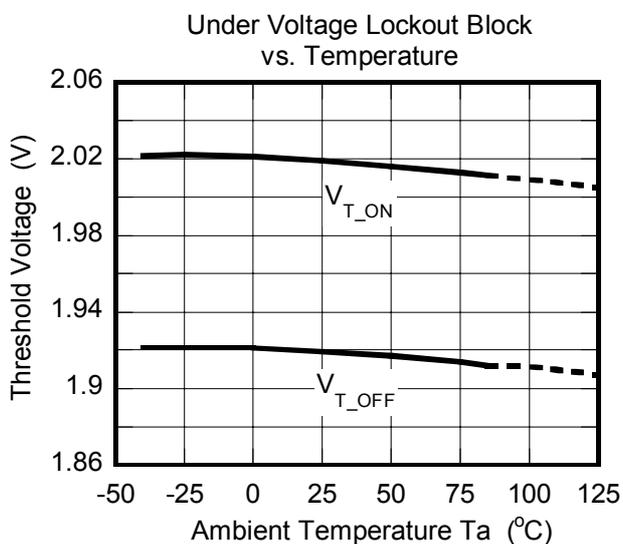
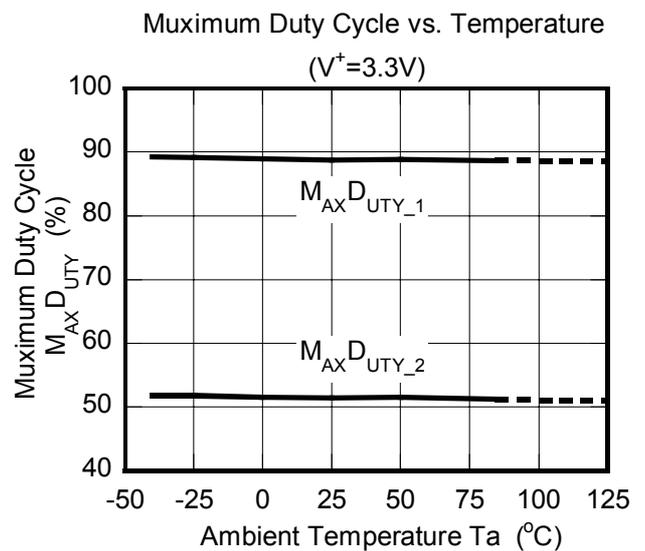
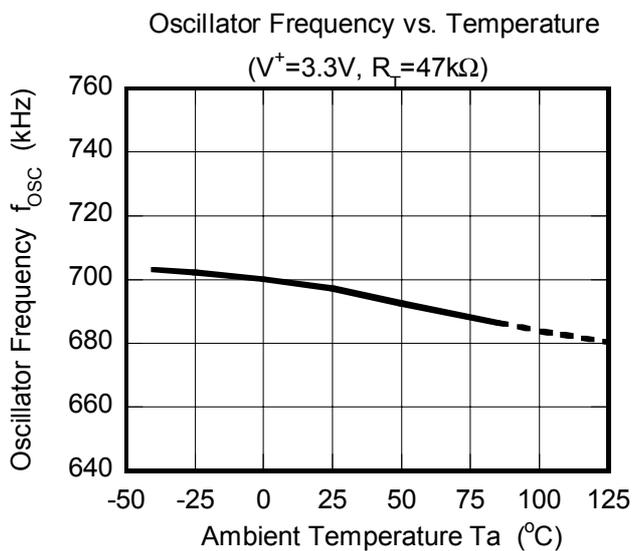
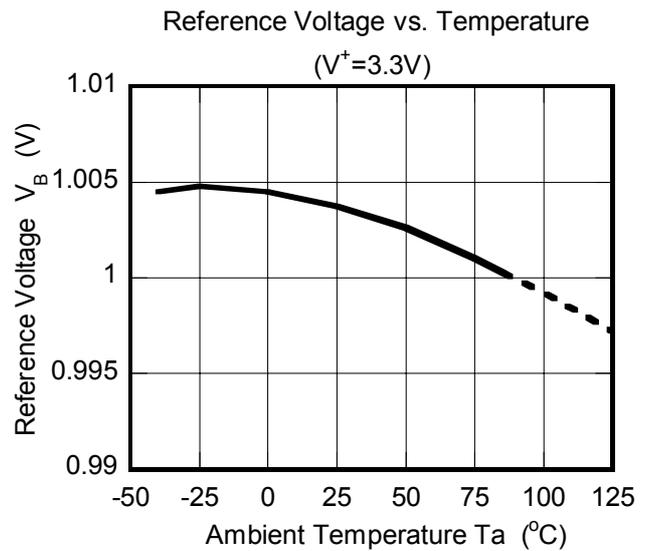
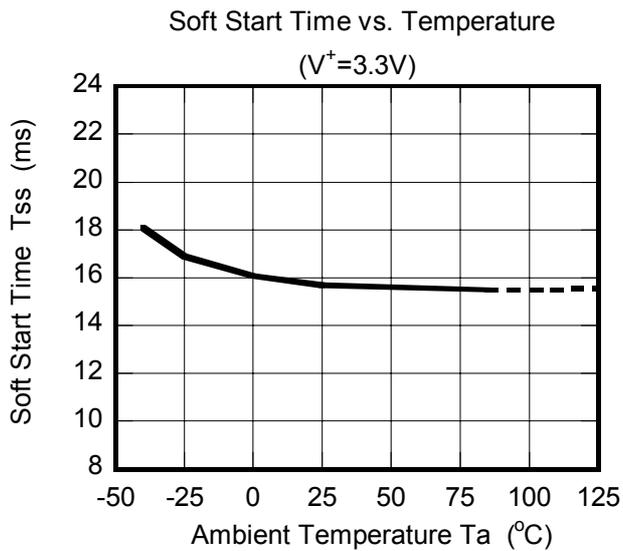
Quiescent Current vs. Operating Voltage
($R_T = 47k\Omega, R_L = \text{Non Load}, T_a = 25^\circ C$)



■ TYPICAL CHARACTERISTICS



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[CAUTION]

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