

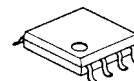
## PWM control Step-Up / Flyback switching regulator IC

### ■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**

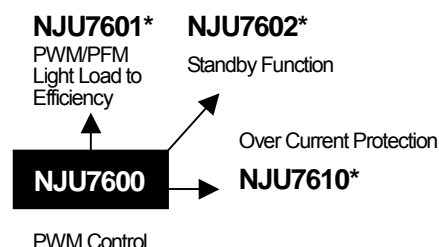


**NJU7600RB1**

### ■FEATURES

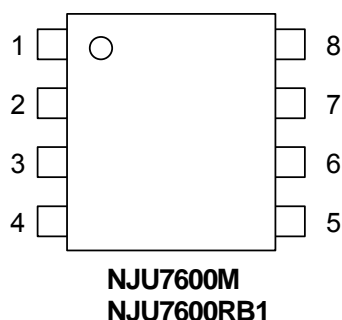
- PWM switching control
- Operating Voltage 2.2V to 8V
- Wide Oscillator Range 300kHz to 1MHz
- Maximum Duty Cycle 90% typ.
- Quiescent Current 800μA typ.
- Soft-Start Function Internal : 16ms typ. or adjustable
- Dead Time Control
- Timer Latch for Short Circuit Protection
- C-MOS Technology
- Package Outline NJU7600M : DMP8  
NJU7600RB1 : TVSP8

### ■PRODUCT VARIATION



\* Under Development

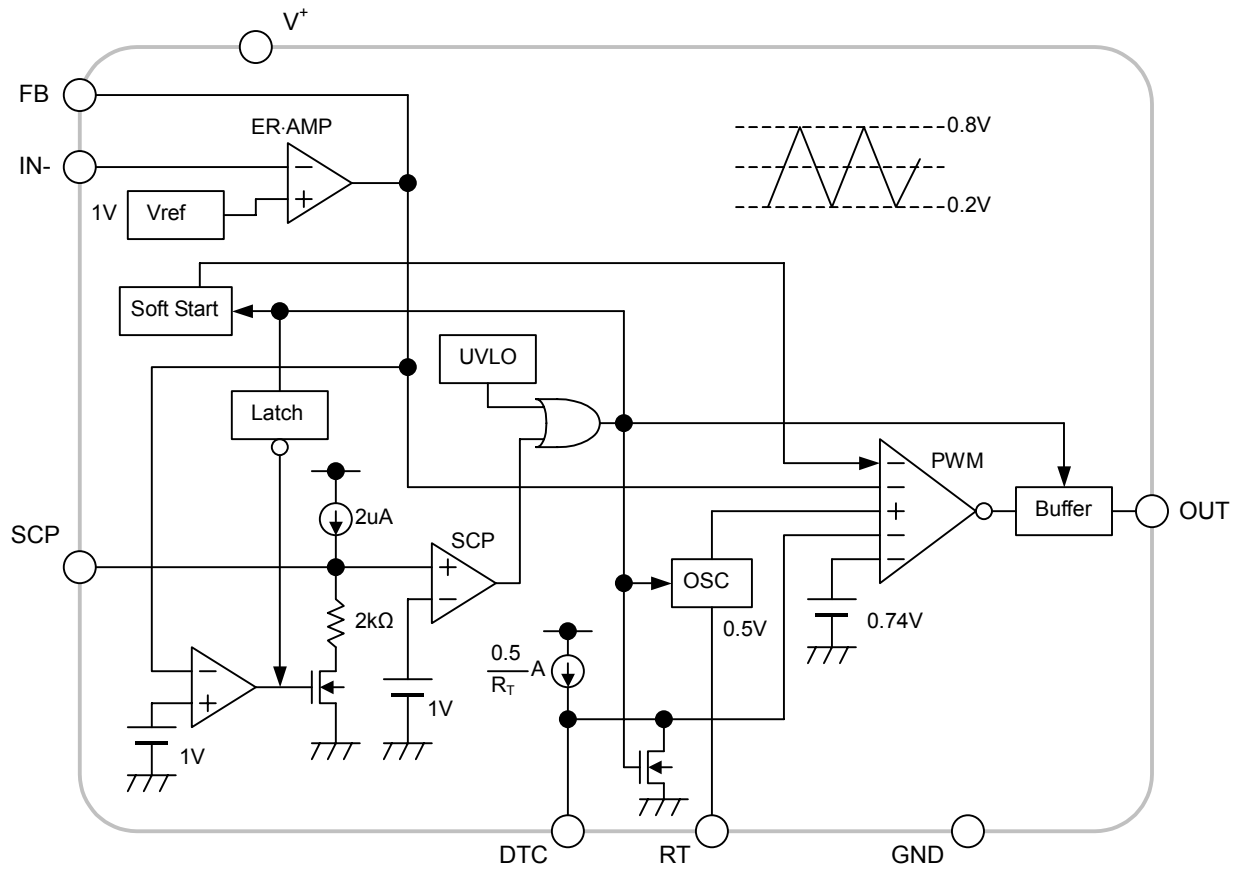
### ■PIN CONFIGURATION



#### PIN FUNCTION

1. V<sup>+</sup>
2. FB
3. IN-
4. SCP
5. DTC
6. RT
7. GND
8. OUT

## ■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 ( $V^+=3.3V$ , $R_T=47k\Omega$ , Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
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### 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
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### 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

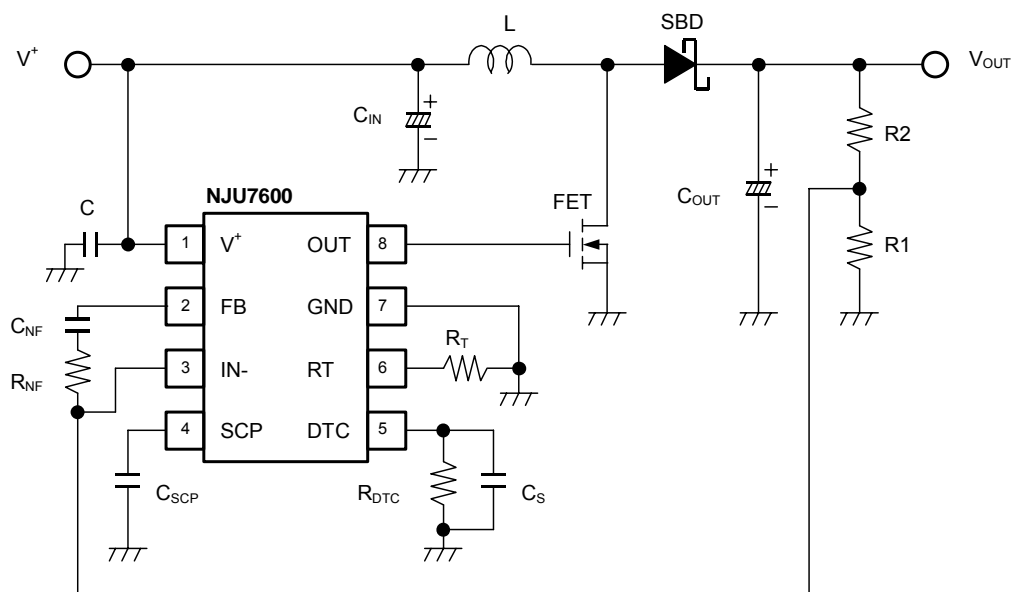
RT Pin Voltage	$V_{RT}$		-5%	0.5	+5%	V
Oscillation Frequency	$f_{OSC}$		630	700	770	kHz
Oscillate Supply Voltage Fluctuations	$f_{DV}$	$V^+=2.2V \sim 8V$	—	1	—	%
Oscillate Temperature Fluctuations	$f_{DT}$	Ta=-40°C ~ +85°C	—	3	—	%

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

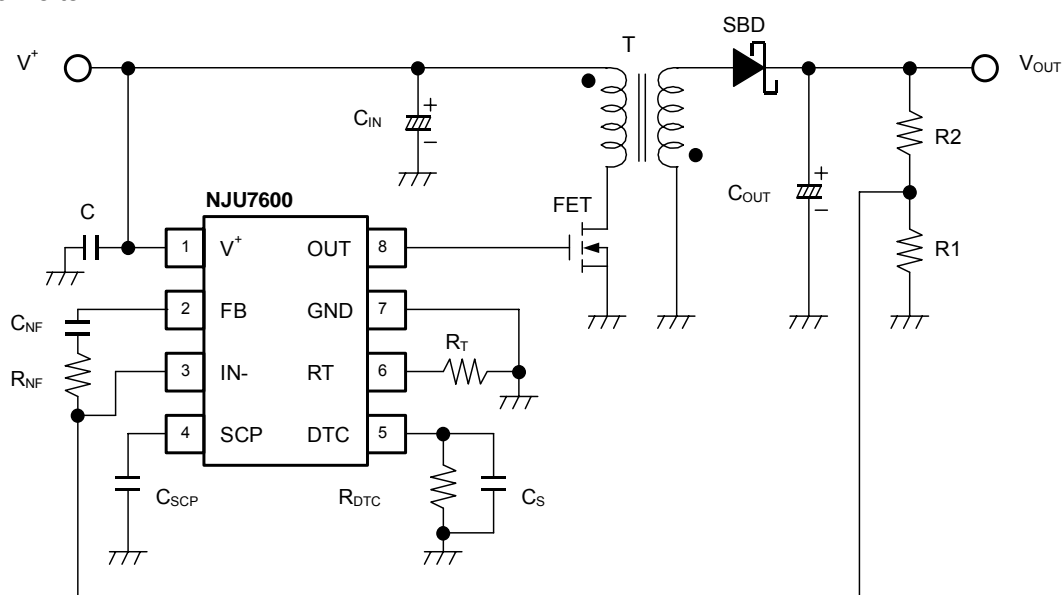
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Error Amplifier Block						
Reference Voltage	$V_B$		-1.5%	1.00	+1.5%	V
Input Bias Current	$I_B$		-0.1	—	0.1	$\mu A$
Open Loop Gain	$A_V$		—	80	—	dB
Gain Bandwidth Product	$G_B$		—	1	—	MHz
Output Source Current	$I_{OM+1}$	$V_{FB}=1V$ , $V_{IN-}=0.9V$	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	$M_{AX}D_{UTY\_1}$	$V_{FB}=0.9V$	85	90	95	%
	$M_{AX}D_{UTY\_2}$	$V_{FB}=0.9V$ , $R_{DTC}=47k\Omega$	40	50	60	%
Output Block						
Output High Level ON Resistance	$R_{OH}$	$I_O=-20mA$	—	10	20	$\Omega$
Output Low Level ON Resistance	$R_{OL}$	$I_O=+20mA$	—	5	10	$\Omega$
General Characteristics						
Quiescent Current	$I_{DD}$	$R_L=Non\ Load$	—	800	1200	$\mu A$

## ■ TYPICAL APPLICATIONS

### Step-Up Converter

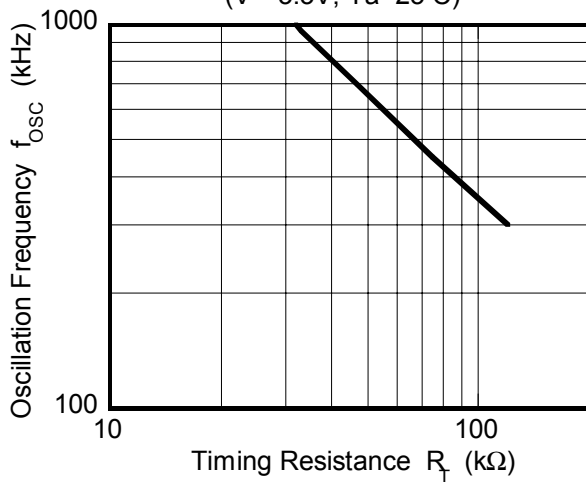


### Flyback Converter

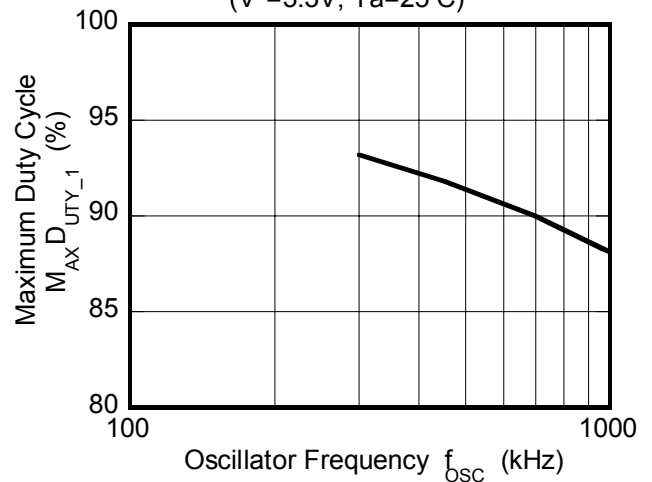


## ■ TYPICAL CHARACTERISTICS

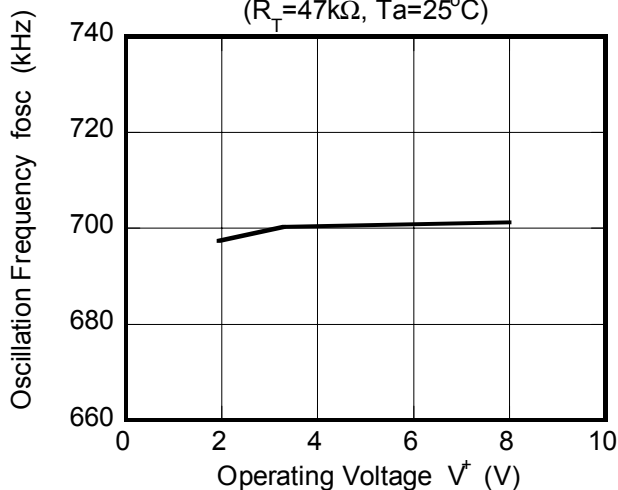
Oscillation Frequency vs. Timing Resistance  
( $V^+=3.3\text{V}$ ,  $T_a=25^\circ\text{C}$ )



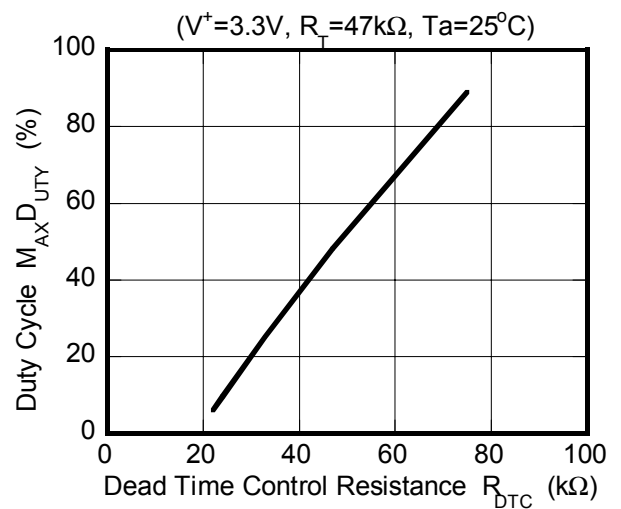
Maximum Duty Cycle vs. Oscillator Frequency  
( $V^+=3.3\text{V}$ ,  $T_a=25^\circ\text{C}$ )



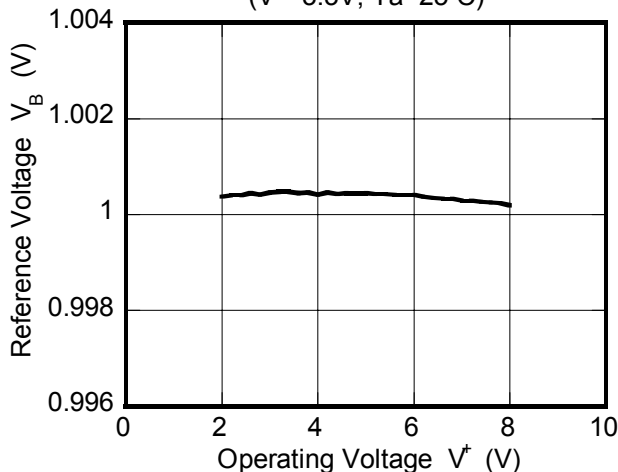
Oscillation Frequency vs. Operating Voltage  
( $R_T=47\text{k}\Omega$ ,  $T_a=25^\circ\text{C}$ )



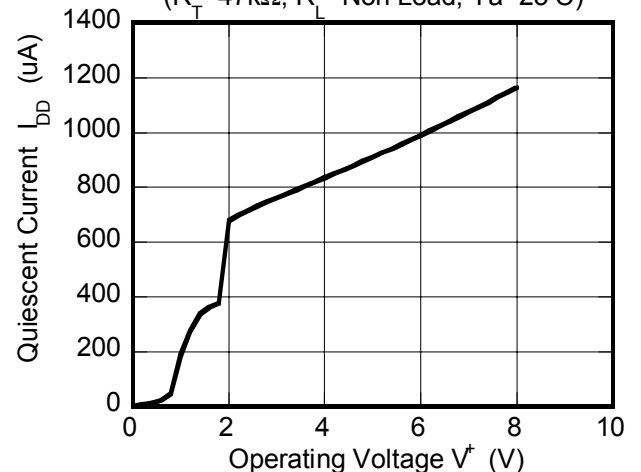
Duty Cycle vs.  $R_{\text{DTC}}$



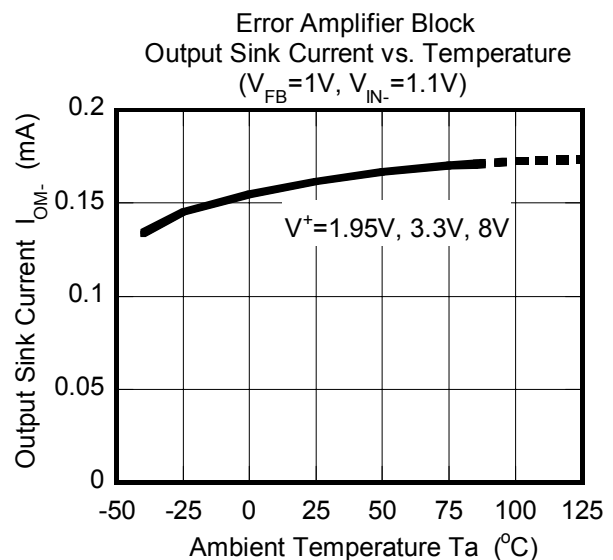
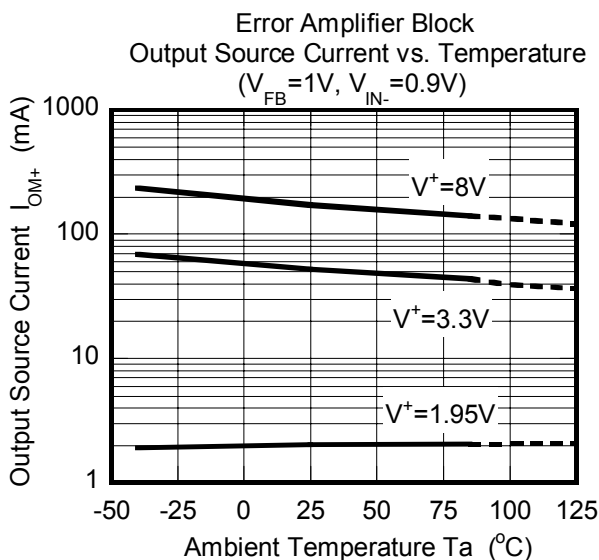
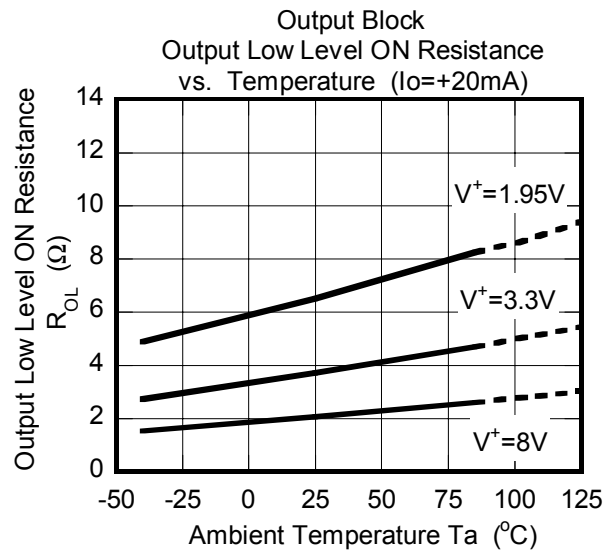
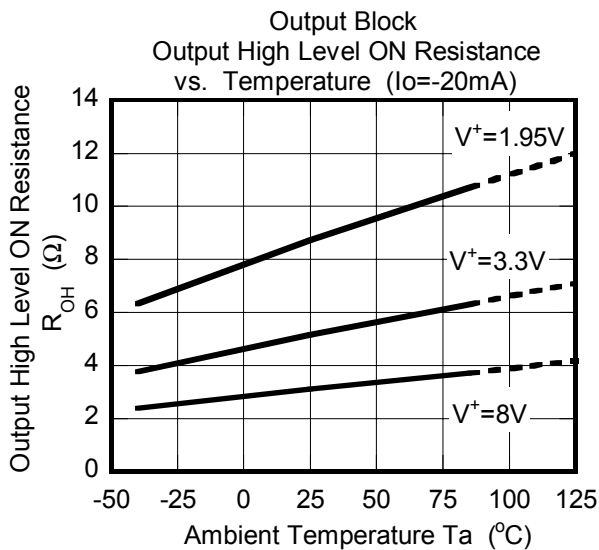
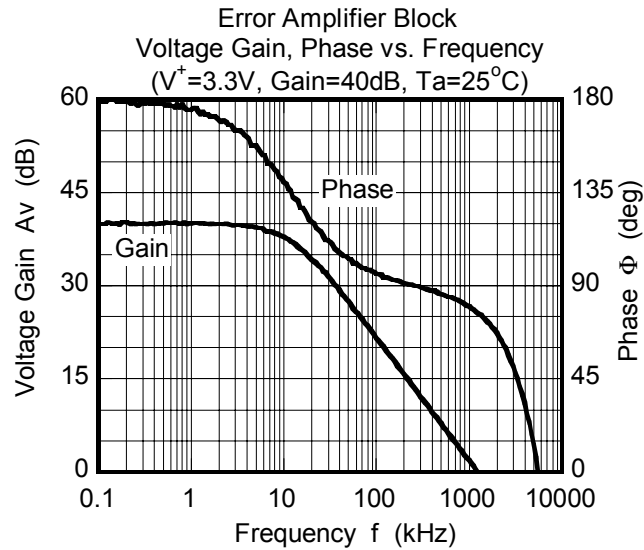
Reference Voltage vs. Operating Voltage  
( $V^+=3.3\text{V}$ ,  $T_a=25^\circ\text{C}$ )



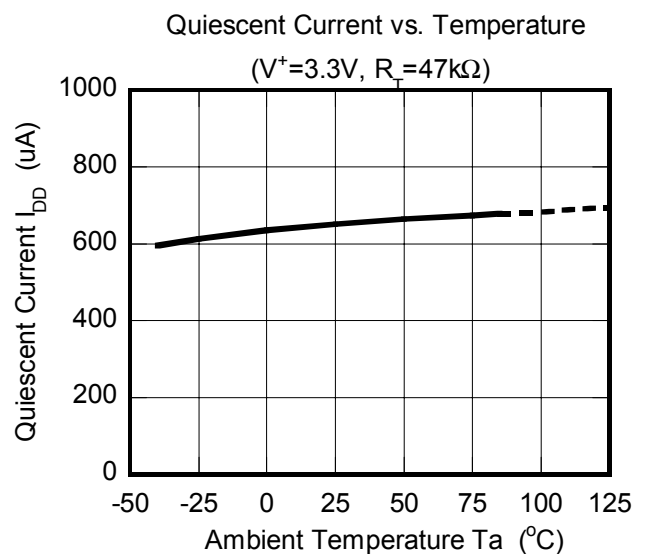
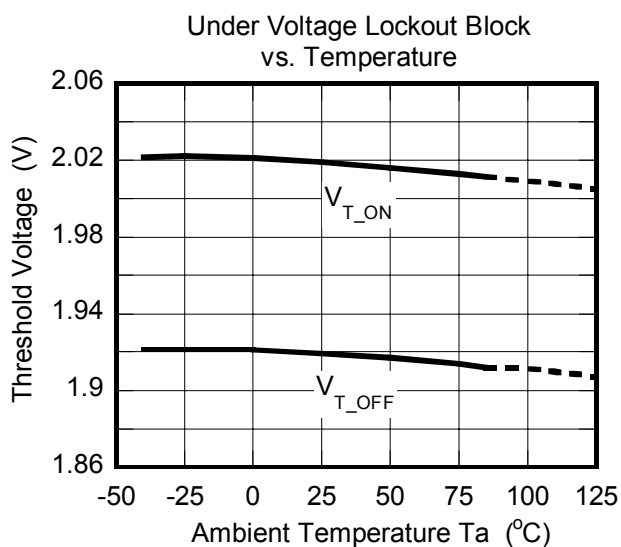
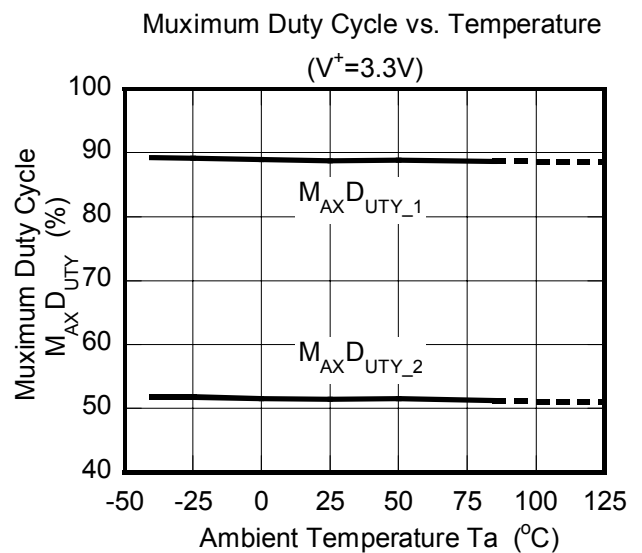
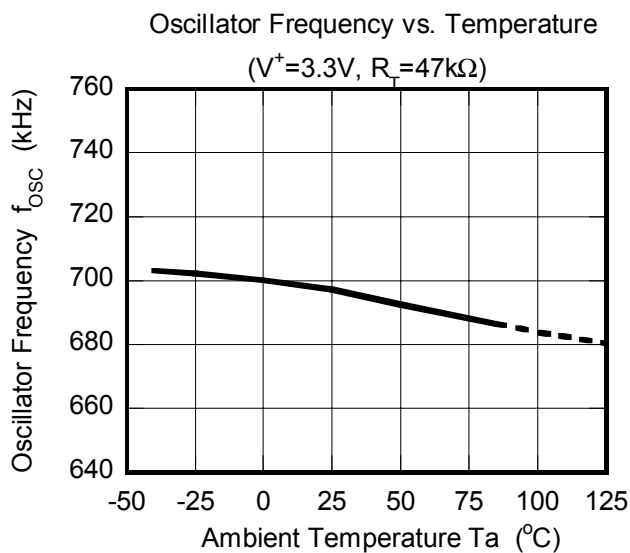
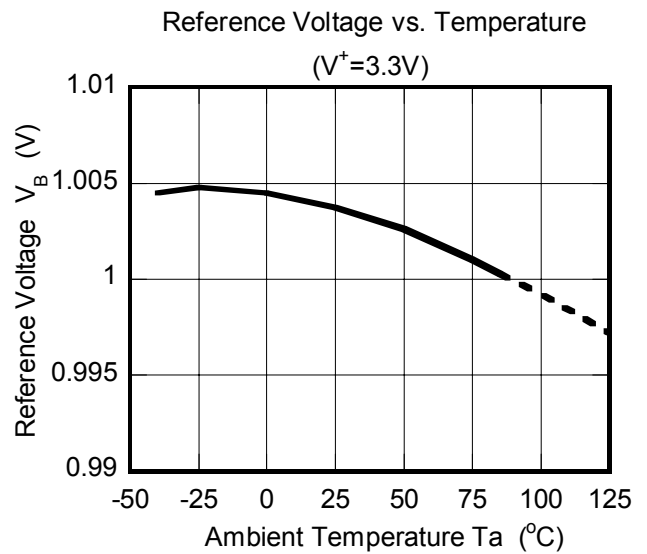
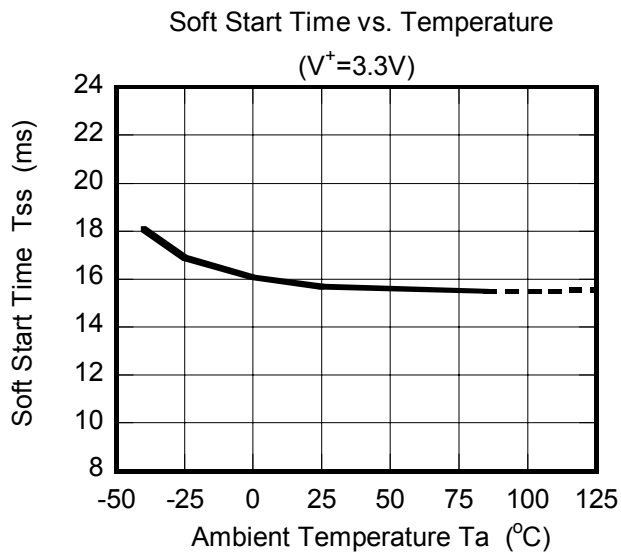
Quiescent Current vs. Operating Voltage  
( $R_T=47\text{k}\Omega$ ,  $R_L=\text{Non Load}$ ,  $T_a=25^\circ\text{C}$ )



■ TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS





## MEMO

**[CAUTION]**

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