

PWM control Step-Up / Flyback switching regulator IC

■GENERAL DESCRIPTION

The **NJU7600** is a low voltage operation high-speed switching regulator control IC for PWM control step-up and fly-back converter. It incorporates a totem pole driver output, which can directly drive an external MOS-FET easily. The NJU7600 also has a soft-start function, dead time control and timer latch for short circuit protection and their times are all adjustable with external parts. It is available in 8-lead DMP, MSOP (TVSP) packages and 10-lead MSOP (TVSP) package. It is suitable for battery powered applications.

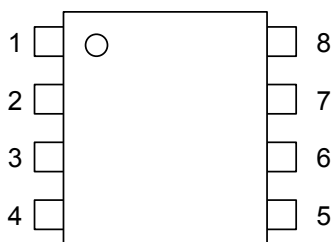
■FEATURES

- PWM switching control
- Operating Voltage 2.2V to 8V
- Wide Oscillator Range 300kHz to 1MHz
- Maximum Duty Cycle 90% typ.
- Quiescent Current 800 μ A 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 : MSOP8 (TVSP8)*
 NJU7600RB2 : MSOP10 (TVSP10)*

*MEET JEDEC MO-187-DA / THIN TYPE

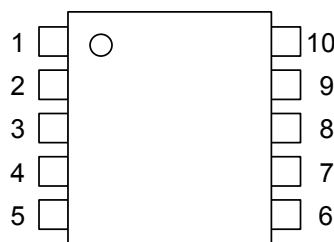
■PIN CONFIGURATION



NJU7600M
NJU7600RB1

PIN FUNCTION

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

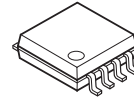


NJU7600RB2

PIN FUNCTION

1. V⁺
2. N.C.
3. FB
4. IN-
5. SCP
6. DTC
7. RT
8. GND
9. GND
10. OUT

■PACKAGE OUTLINE



NJU7600M
(DMP8)

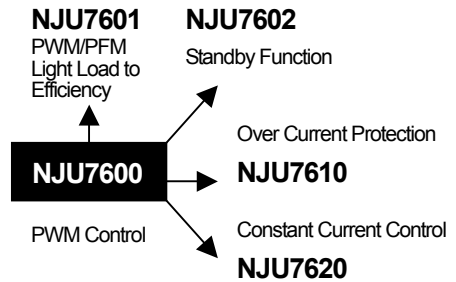


NJU7600RB1
(MSOP8 (TVSP8))



NJU7600RB2
(MSOP10(TVSP10))

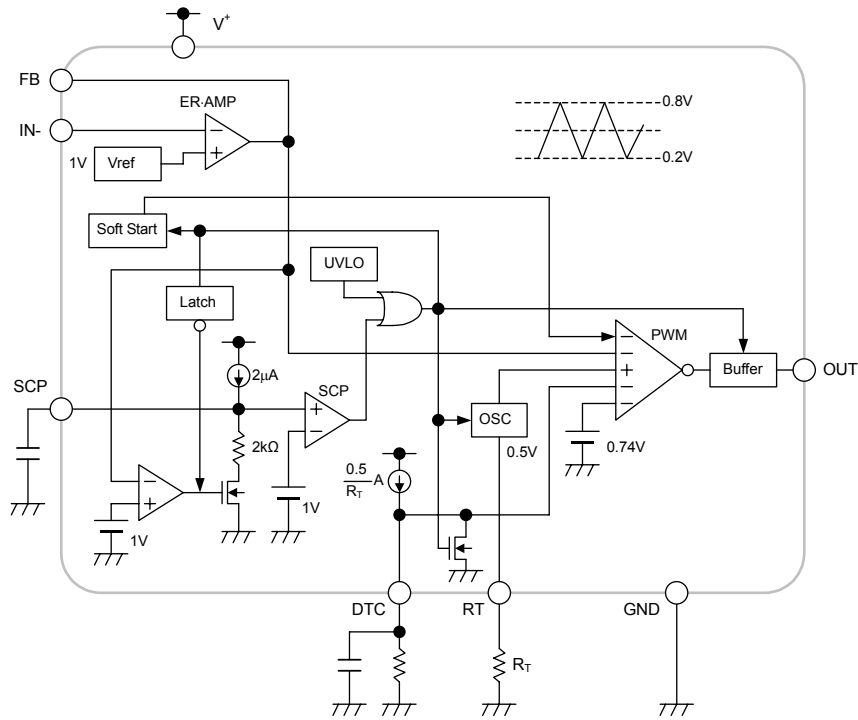
■PRODUCT VARIATION



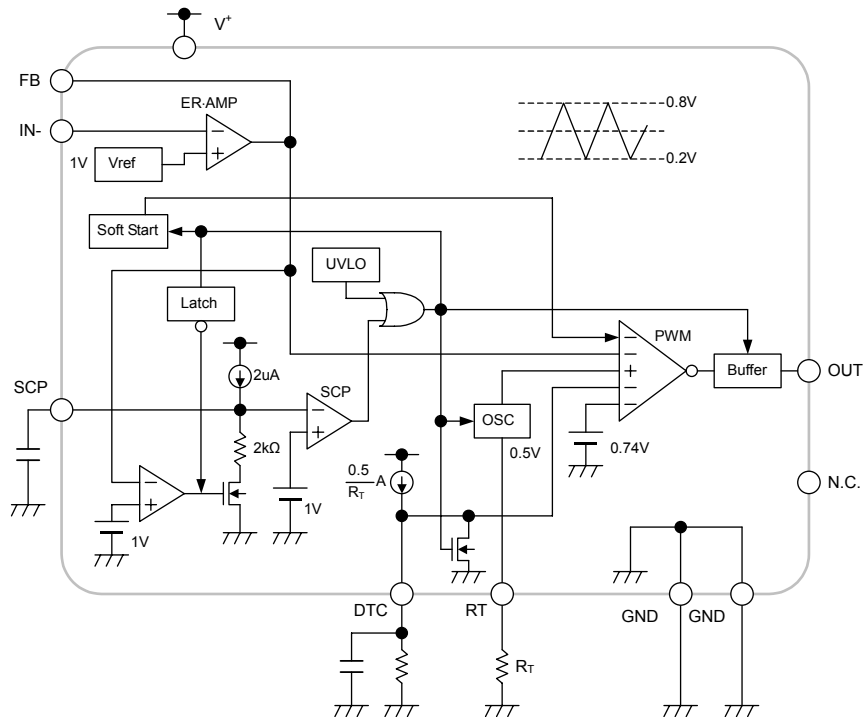
NJU7600

■BLOCK DIAGRAM

NJU7600M
NJU7600RB1



NJU7600RB2



■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 MSOP8 (TVSP8) : 320 MSOP10 (TVSP10) : 320	mW
Operating Temperature Range	T _{OPR}	-40 to +85	°C
Storage Temperature Range	T _{STG}	-40 to +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=47kΩ, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Under Voltage Lockout Block						
ON Threshold Voltage	V _{T_ON}	V ⁺ = L → H	1.9	2.0	2.1	V
OFF Threshold Voltage	V _{T_OFF}	V ⁺ = H → 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} → 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 to 8V	—	1	—	%
Oscillate Temperature Fluctuations	f _{DT}	Ta=-40°C to +85°C	—	3	—	%

NJU7600

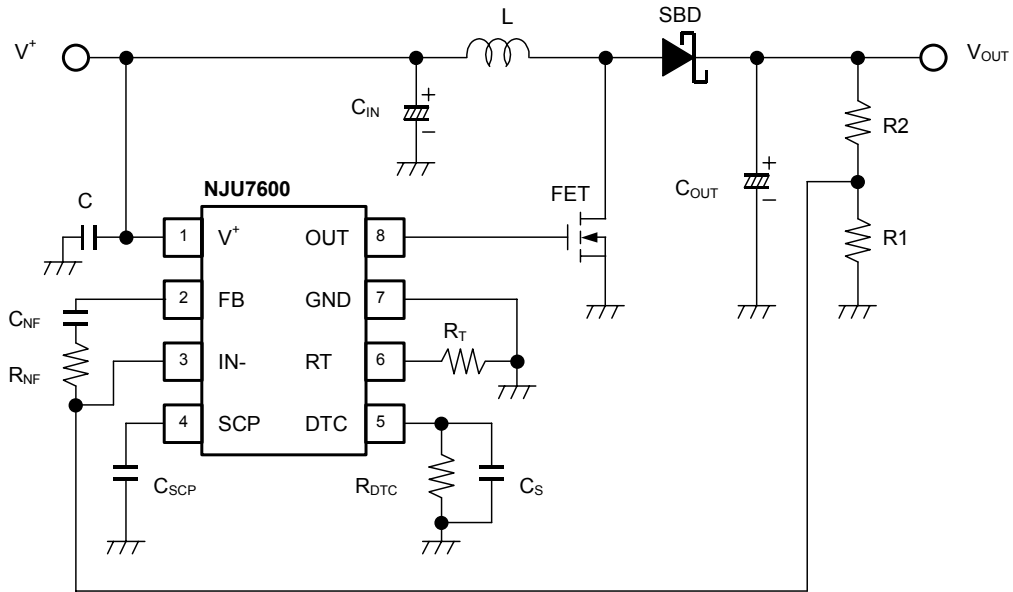
■ELECTRICAL CHARACTERISTICS

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

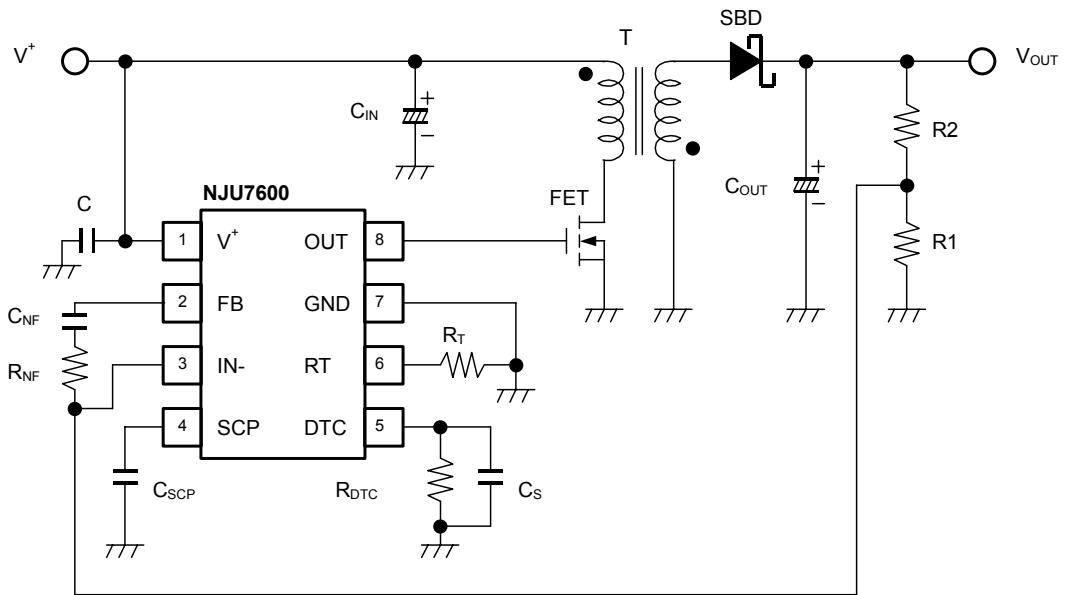
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Error Amplifier Block						
Reference Voltage	V_B		-1.5%	1.00	+1.5%	V
Input Bias Current	I_B		-0.1	–	0.1	μA
Open Loop Gain	A_V		–	80	–	dB
Gain Bandwidth Product	G_B		–	1	–	MHz
Output Source Current	I_{OM+1}	$V_{FB}=1V, V_{IN-}=0.9V$	25	55	95	mA
	I_{OM+2}	$V_{FB}=1V, V_{IN-}=0.9V, V^+=2.2V$	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_{T_0}	Duty=0%	0.16	0.22	0.28	V
	$V_{T_{50}}$	Duty=50%	0.44	0.5	0.56	V
Maximum Duty Cycle	M_{AXDUTY_1}	$V_{FB}=0.9V$	85	90	95	%
	M_{AXDUTY_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	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

Step-Up Converter

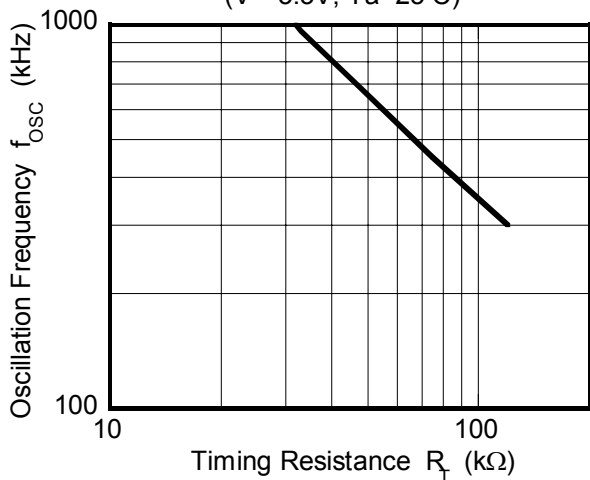


Flyback Converter

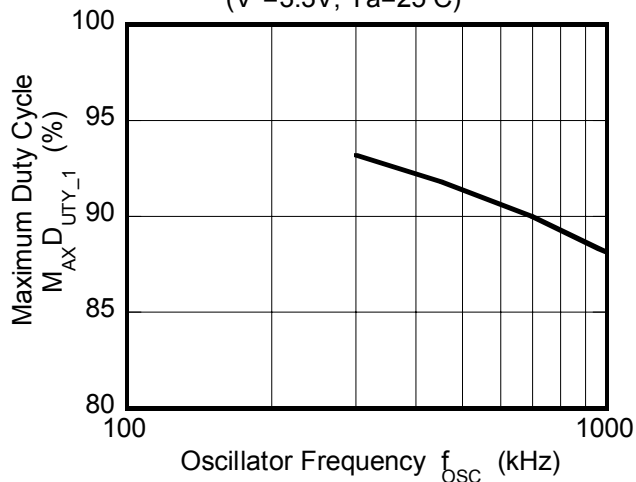


■ TYPICAL CHARACTERISTICS

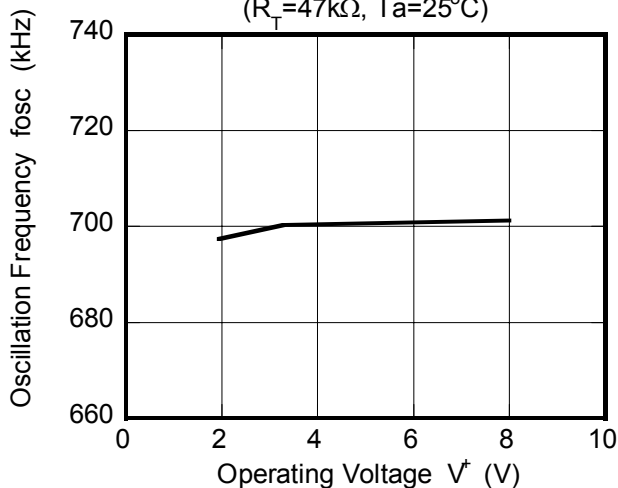
Oscillation Frequency vs. Timing Resistance
($V^+ = 3.3V, T_a = 25^\circ C$)



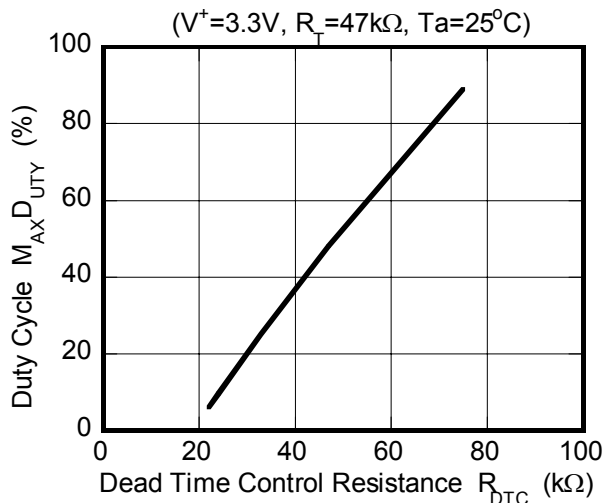
Maximum Duty Cycle vs. Oscillator Frequency
($V^+ = 3.3V, T_a = 25^\circ C$)



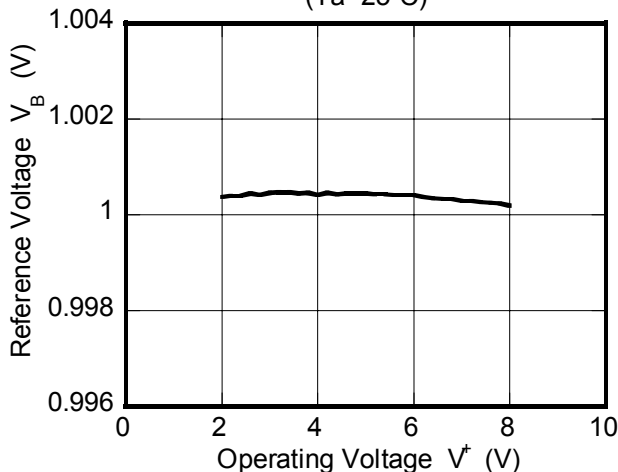
Oscillation Frequency vs. Operating Voltage
($R_T = 47k\Omega, T_a = 25^\circ C$)



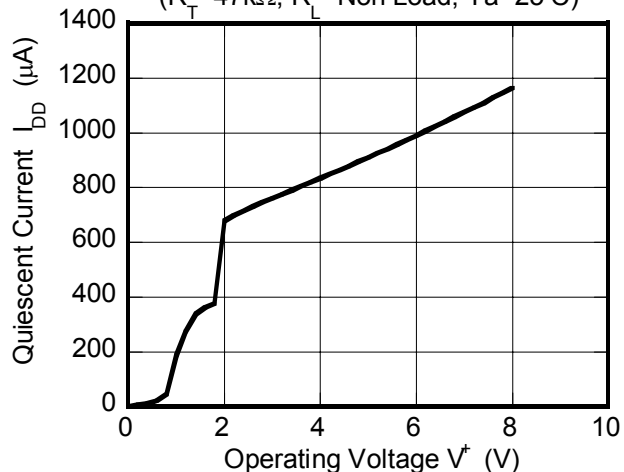
Duty Cycle vs. R_{DTC}



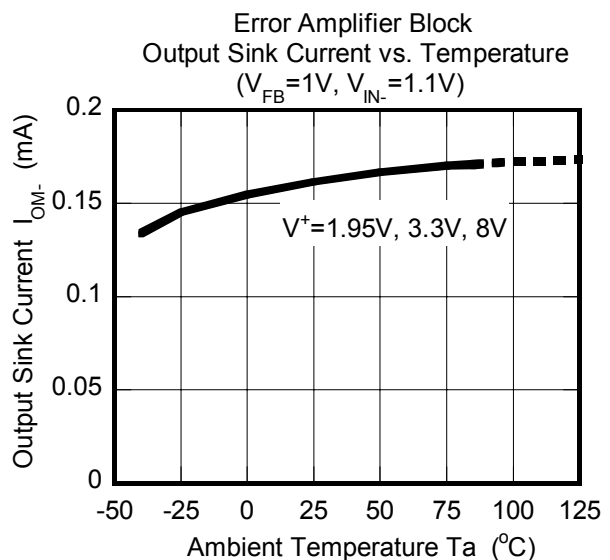
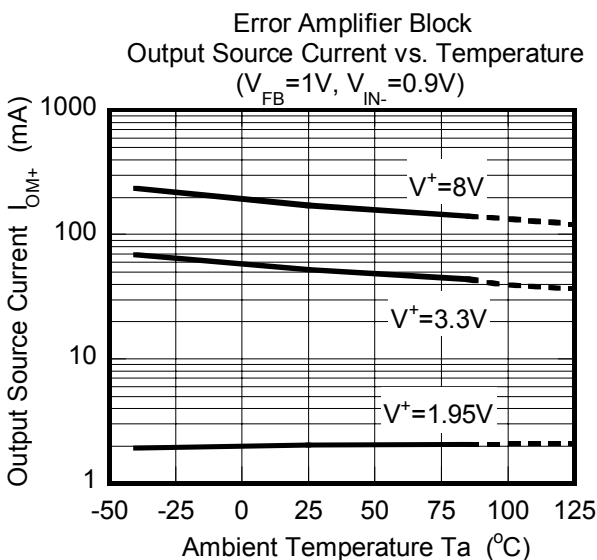
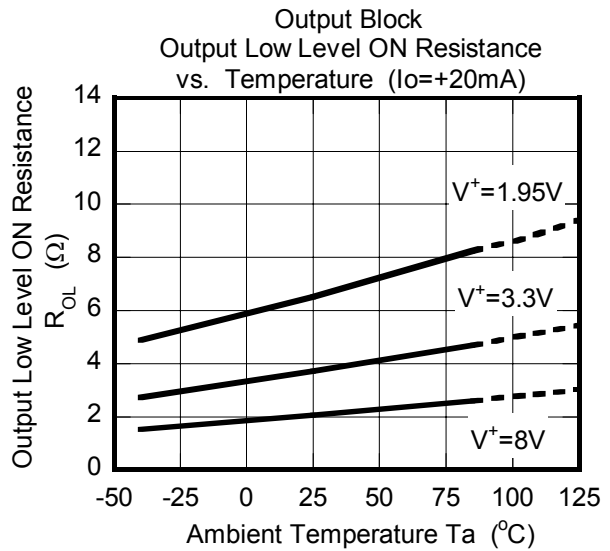
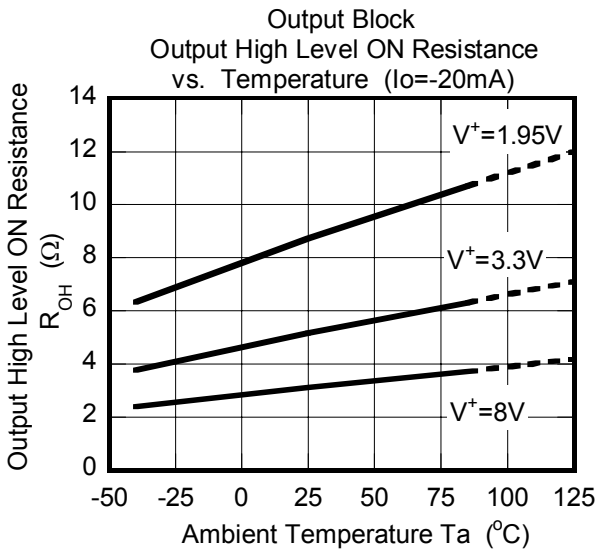
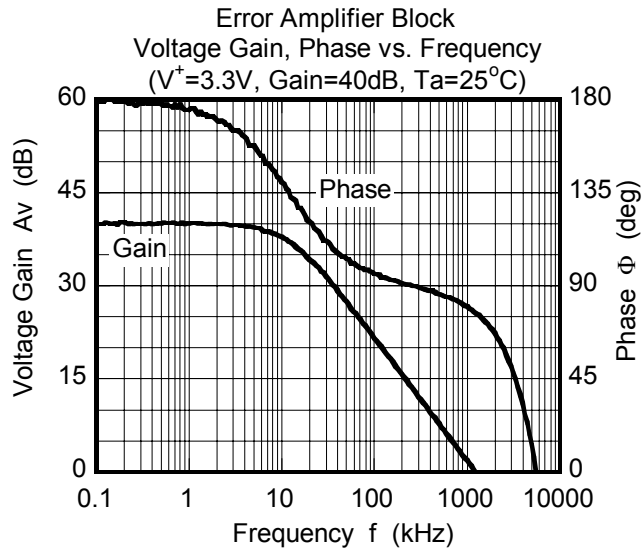
Reference Voltage vs. Operating Voltage
($T_a = 25^\circ C$)



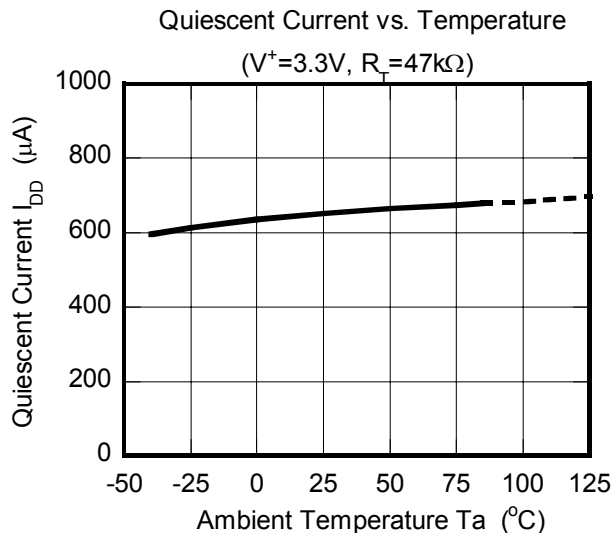
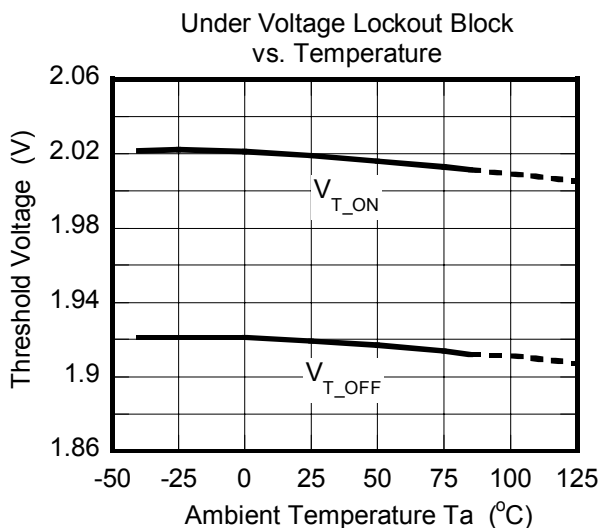
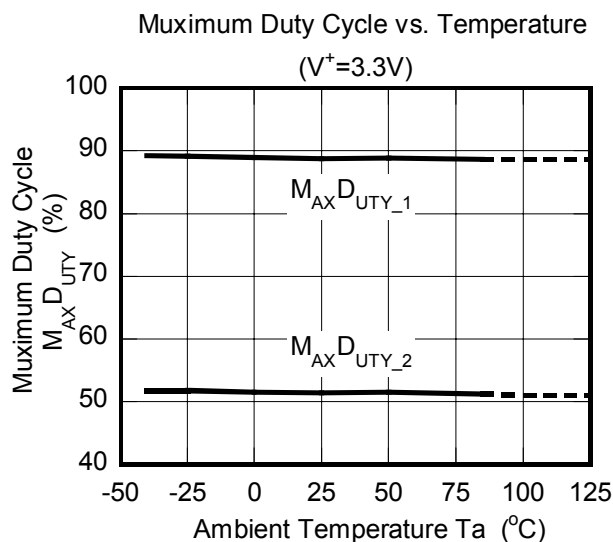
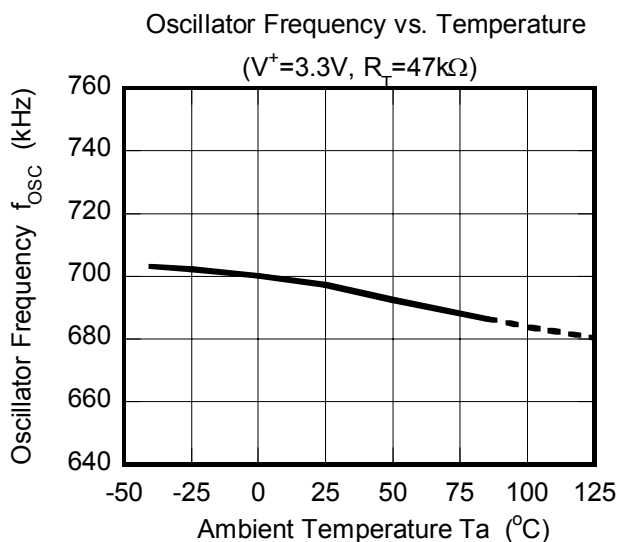
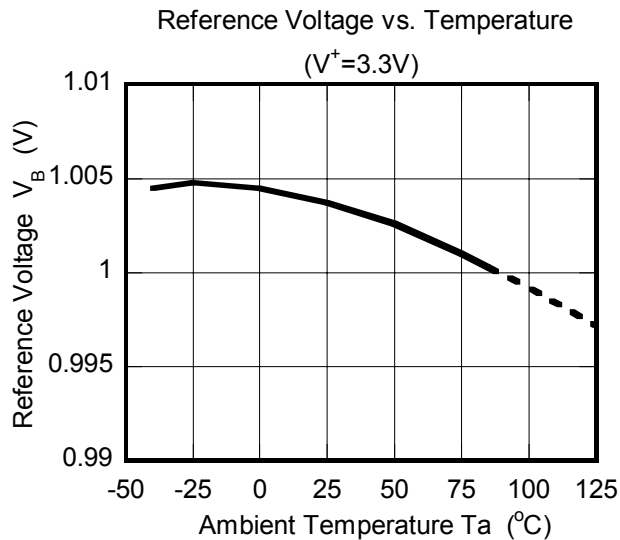
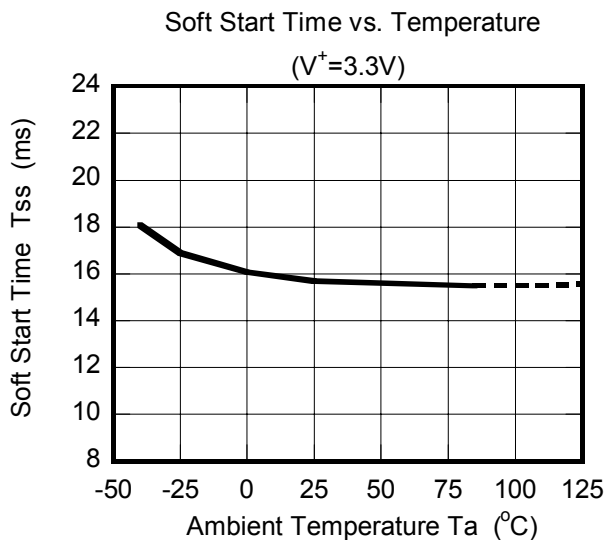
Quiescent Current vs. Operating Voltage
($R_T = 47k\Omega, R_L = \text{Non Load}, T_a = 25^\circ C$)



■ TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS



MEMO

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