

Step-Down switching regulator IC with standby function

■ GENERAL DESCRIPTION

The **NJU7632** is a low voltage operation high-speed switching regulator control IC for step-down converter, with a standby function. It incorporates a totem pole output, which can drive an external MOS-FET easily. The NJU7632 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. Further the internal standby function minimize the current during non-active condition. It is available in a small and thin 8-lead MSOP (TVSP) package, and it is suitable for battery powered applications.

■ FEATURES

- PWM switching control
- Standby Function
- Operating Voltage 2.2V to 8V
- Wide Oscillator Range 300kHz to 1MHz
- Maximum Duty Cycle 100%
- Quiescent Current Operating :800 μ A typ.
Standby :1 μ A max.
Internal :16ms typ. or adjustable
- Soft-Start Function
- Dead Time Control
- Timer Latch for Short Circuit Protection
- C-MOS Technology
- Package Outline NJU7632RB1 : MSOP8 (TVSP8)*

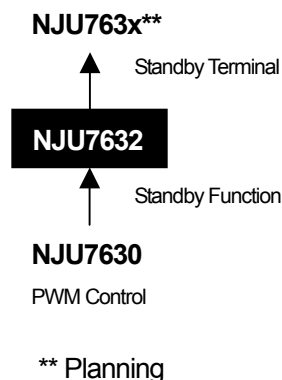
*MEET JEDEC MO-187-DA / THIN TYPE

■ PACKAGE OUTLINE

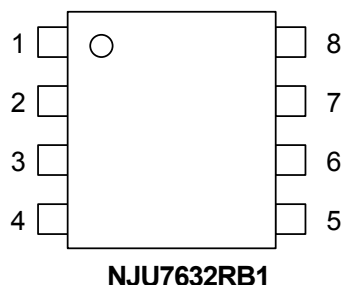


NJU7632RB1
(MSOP8 (TVSP8))

■ PRODUCT VARIATION



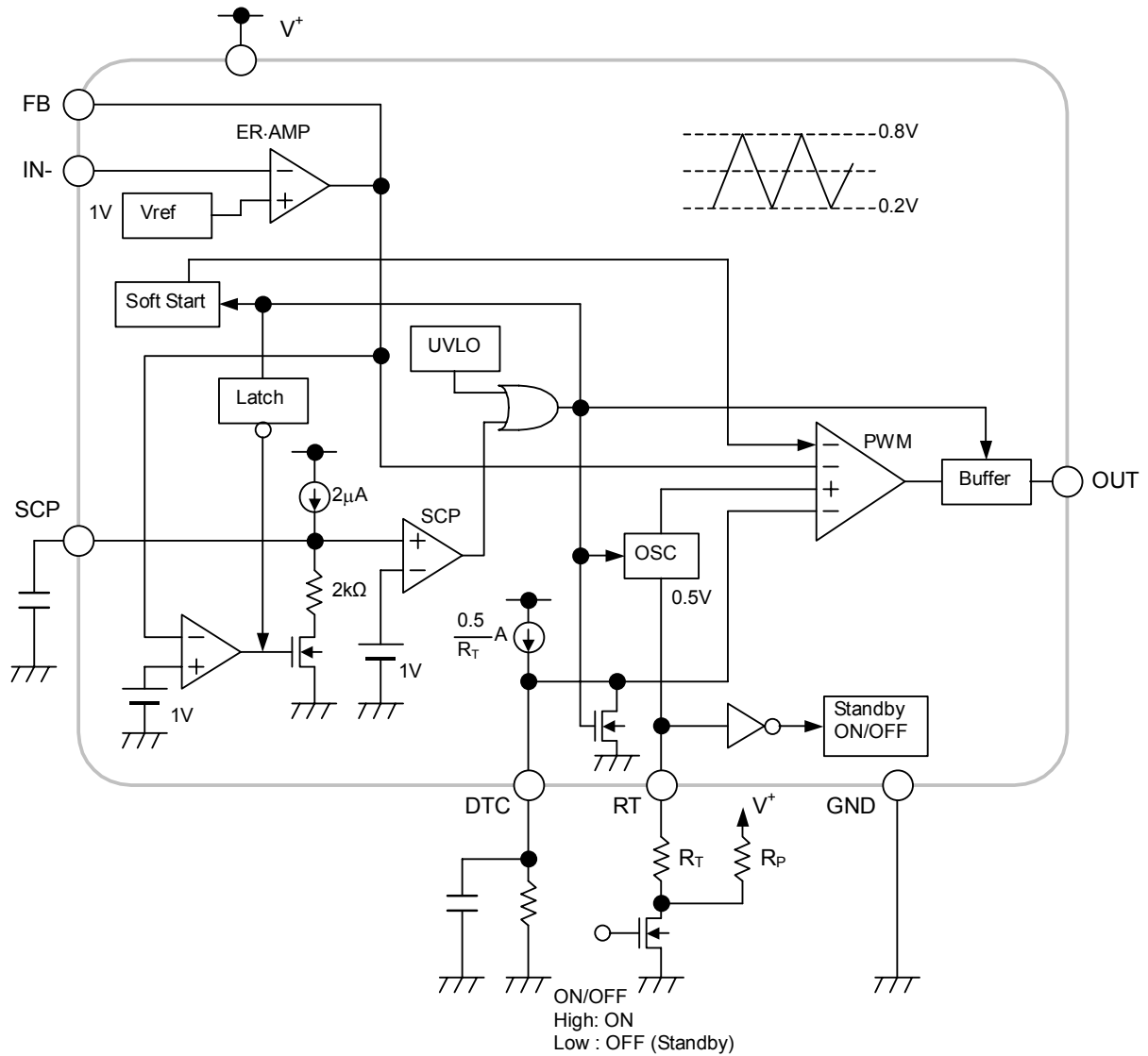
■ PIN CONFIGURATION



PIN FUNCTION

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

■ 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	MSOP8 (TVSP8) :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

($V^+=3.3V$, $R_T=47k\Omega$, 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}	$V_{T_ON} \rightarrow \text{Duty}=80\%$	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}	$V^+=2.2V$ to 8V	—	1	—	%
Oscillate Temperature Fluctuations	f_{DT}	Ta=-40°C to +85°C	—	3	—	%
Standby RT Terminal Resistance	R_{T_STB}		—	2	—	MΩ

■ ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
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Error Amplifier Block

Reference Voltage	V_B		-1.0%	1.00	+1.0%	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}	$V_{FB}=1V$, $V_{IN}=0.9V$	20	45	70	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 Complete 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	$M_{AX}D_{UTY1}$	$V_{FB}=0.9V$	100	—	—	%
	$M_{AX}D_{UTY2}$	$V_{FB}=0.9V$, $R_{DTC}=47k\Omega$	40	50	60	%

Output Block

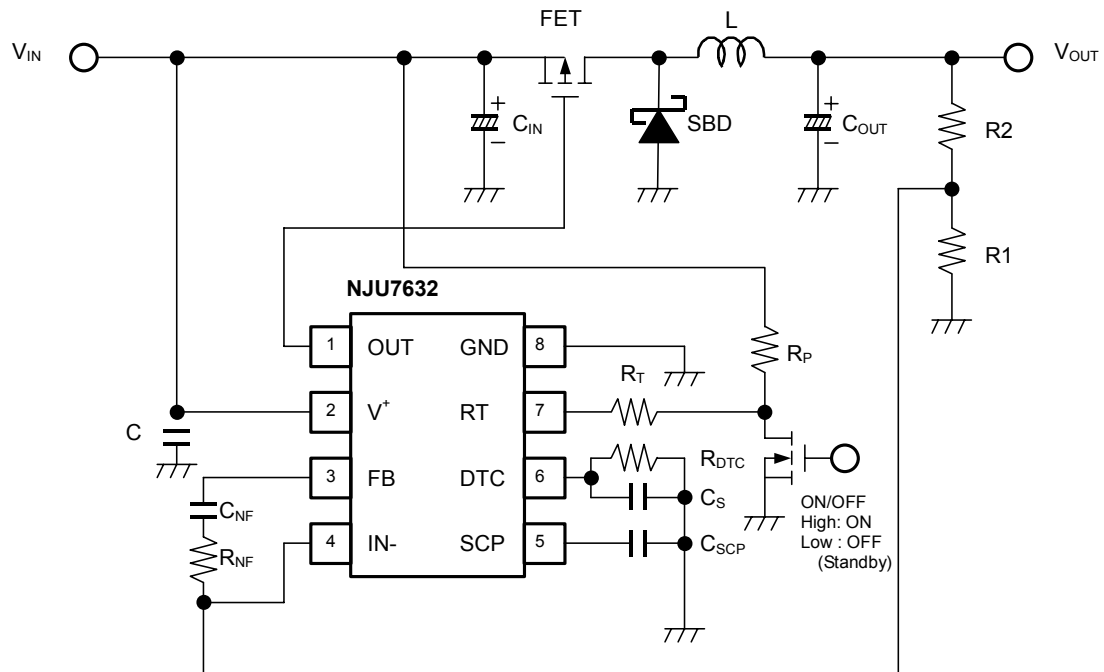
Output High Level ON Resistance	R_{OH}	$I_O=-20mA$	—	10	20	Ω
Output Low Level ON Resistance	R_{OL}	$I_O=+20mA$	—	5	10	Ω

General Characteristics

Quiescent Current	I_{DD}	$R_L=Non\ Load$	—	800	1200	μA
Standby Quiescent Current	I_{DD_STB}	$R_T=Open$	—	—	1.0	μA

■ TYPICAL APPLICATIONS

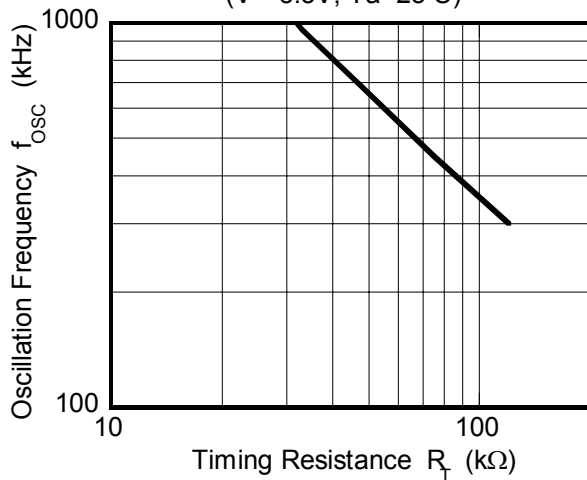
Step-Down Converter



■TYPICAL CHARACTERISTICS

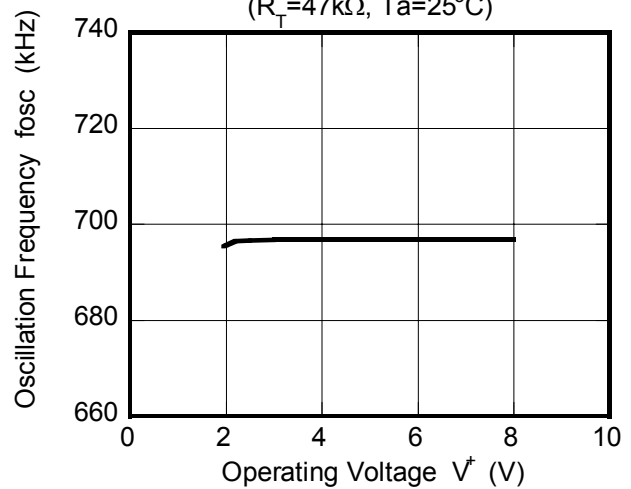
Oscillation Frequency vs. Timing Resistance

($V^+ = 3.3\text{V}$, $T_a = 25^\circ\text{C}$)



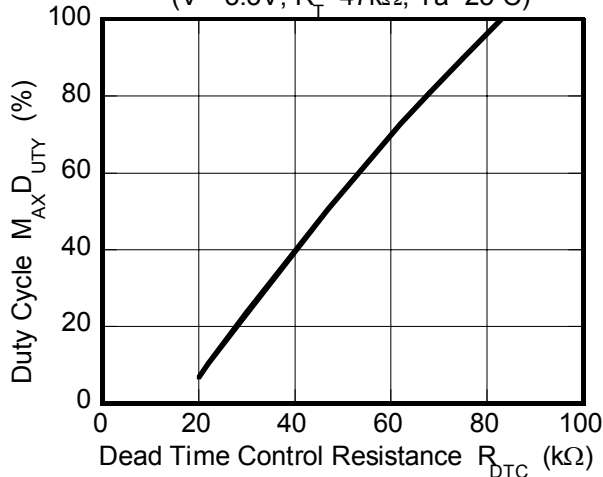
Oscillation Frequency vs. Operating Voltage

($R_T = 47\text{k}\Omega$, $T_a = 25^\circ\text{C}$)



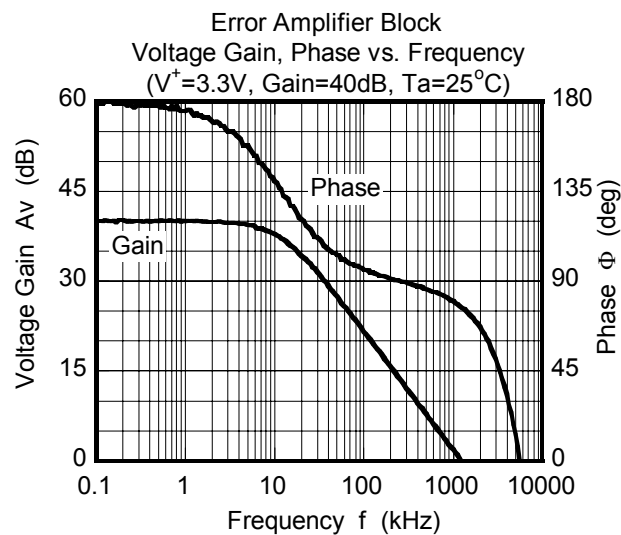
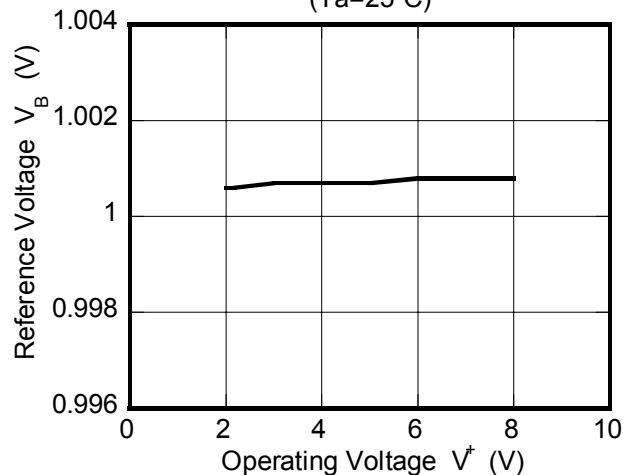
Duty Cycle vs. R_{DTC}

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



Reference Voltage vs. Operating Voltage

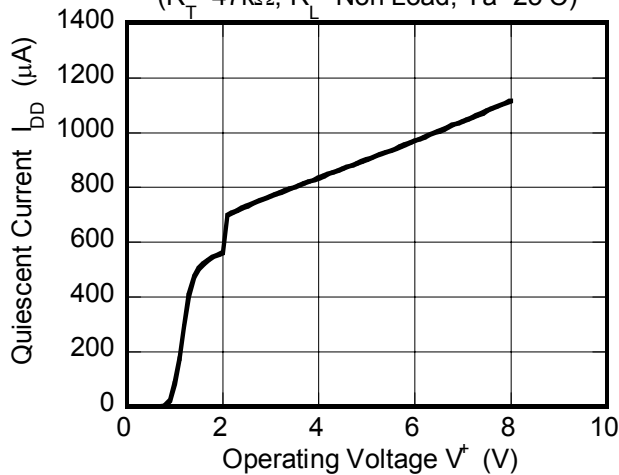
($T_a = 25^\circ\text{C}$)



■ TYPICAL CHARACTERISTICS

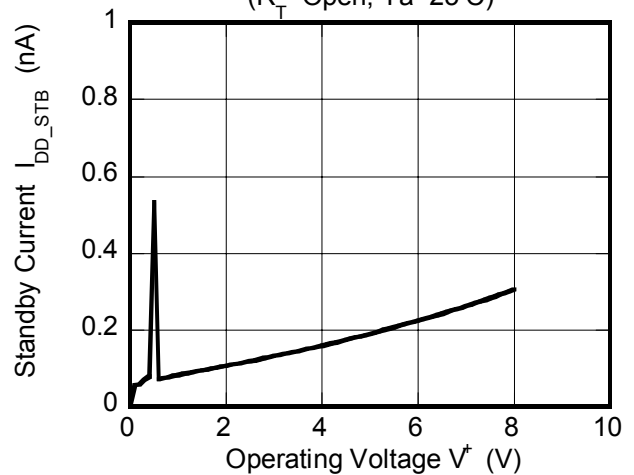
Quiescent Current vs. Operating Voltage

($R_T=47k\Omega$, R_L =Non Load, $T_a=25^\circ\text{C}$)



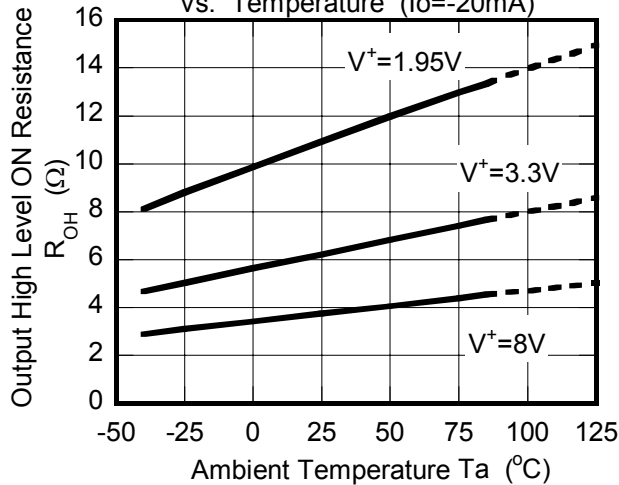
Standby Current vs. Operating Voltage

(R_T =Open, $T_a=25^\circ\text{C}$)



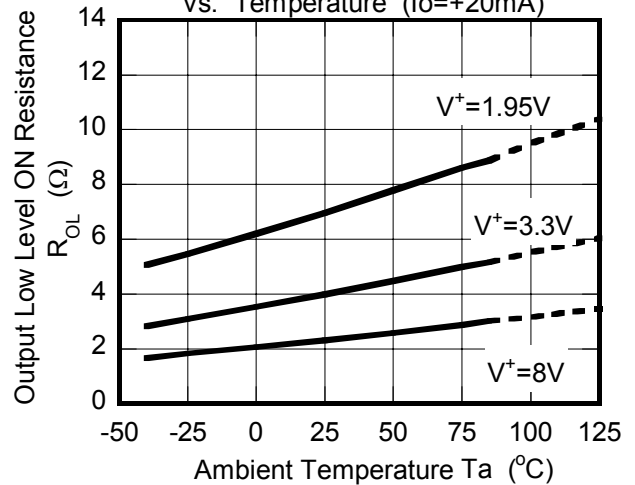
Output Block

Output High Level ON Resistance vs. Temperature ($I_O=-20\text{mA}$)



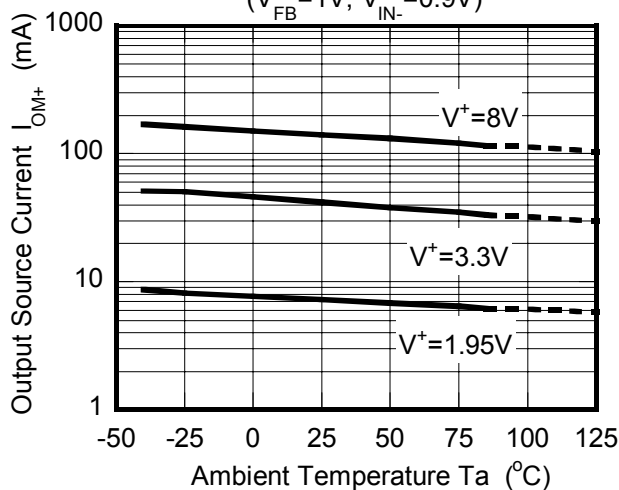
Output Block

Output Low Level ON Resistance vs. Temperature ($I_O=+20\text{mA}$)



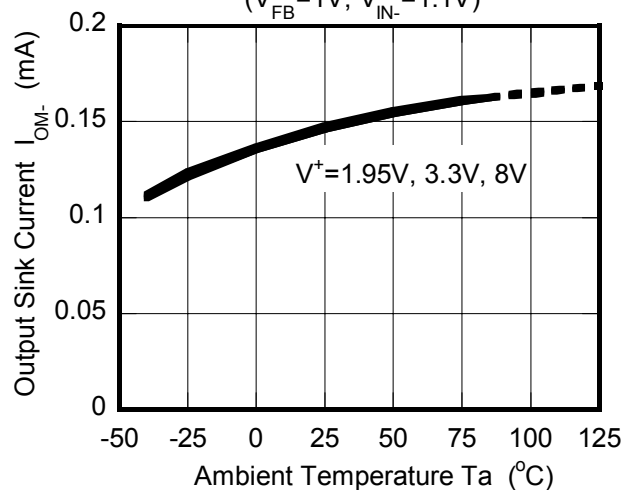
Error Amplifier Block

Output Source Current vs. Temperature ($V_{FB}=1\text{V}$, $V_{IN-}=0.9\text{V}$)

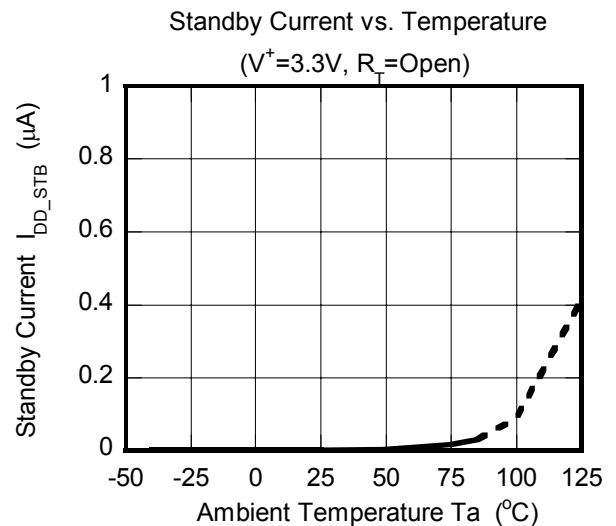
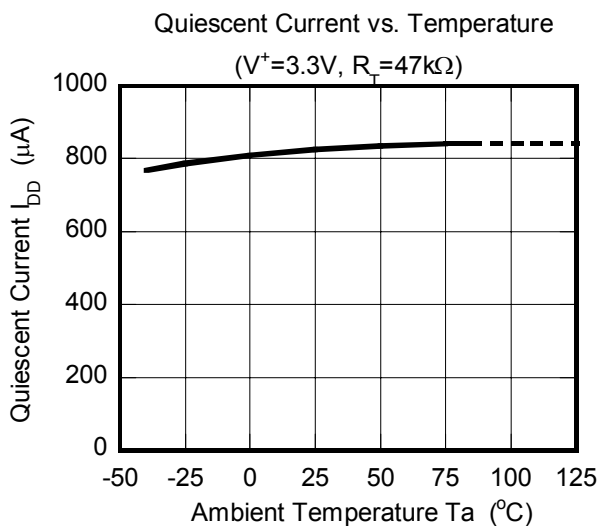
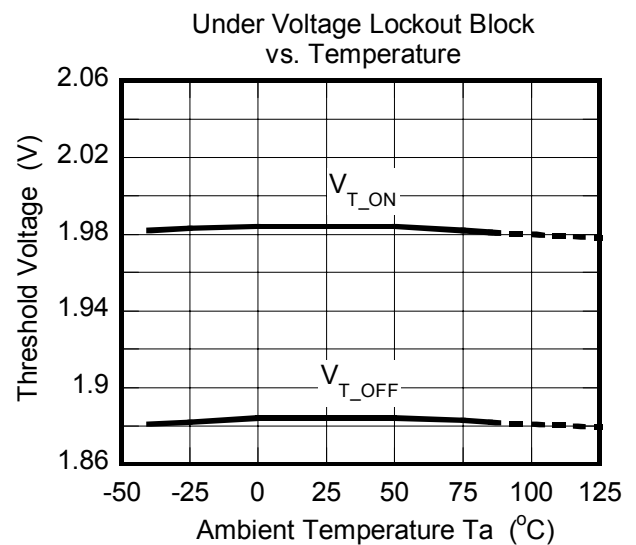
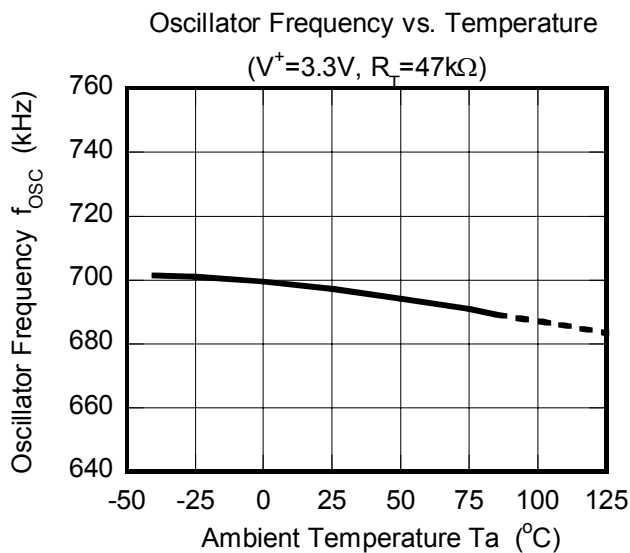
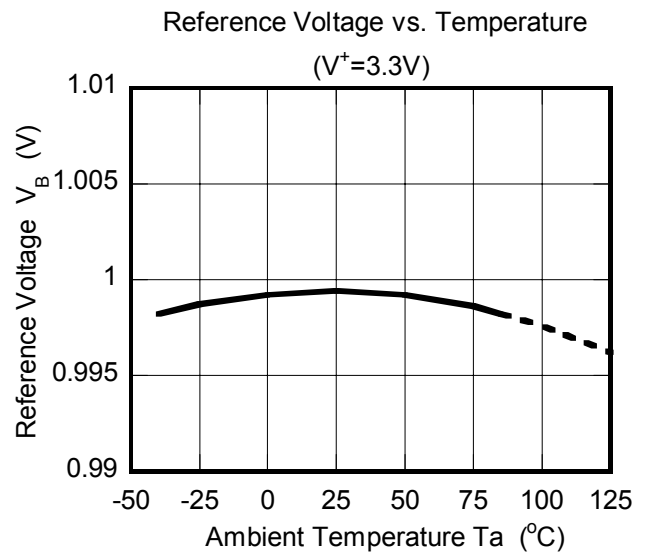
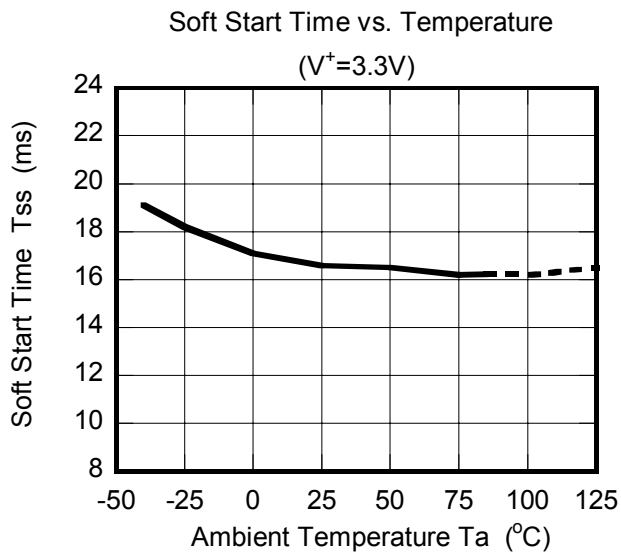


Error Amplifier Block

Output Sink Current vs. Temperature ($V_{FB}=1\text{V}$, $V_{IN-}=1.1\text{V}$)



■ TYPICAL CHARACTERISTICS



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