Switching Regulator IC for Boost Converter

Current Mode Control w/ 45V/1.75A MOSFET

■ GENERAL DESCRIPTION

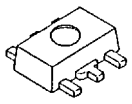
The **NJW4132** is a boost converter with 45V/1.75A MOSFET. It corresponds to high oscillating frequency, and Low ESR Output Capacitor (MLCC) within wide input range from 4.5V to 40V.

Therefore, the **NJW4132** can realize downsizing of applications with a few external parts so that adopts current mode control.

Also, it has a soft start function, external clock synchronization, over current protection and thermal shutdown circuit.

It is suitable for boost application to a Car Accessory, Office Automation Equipment, Industrial Instrument and so on.

■ PACKAGE OUTLINE



NJW4132U2

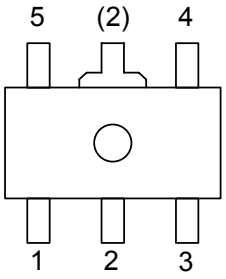
■ FEATURES

- Current Mode Control
- External Clock Synchronization
- Wide Operating Voltage Range 4.5V to 40V
- Switching Current 1.75A min.
- PWM Control
- Built-in Compensation Circuit
- Correspond to Ceramic Capacitor (MLCC)
- Oscillating Frequency 300kHz typ. (A ver.)
  700kHz typ. (B ver.)
- Soft Start Function 10ms typ.
- UVLO (Under Voltage Lockout)
- Over Current Protection (Hiccup type)
- Thermal Shutdown Protection
- Standby Function
- Package Outline NJW4132U2 : SOT-89-5

■ PRODUCT CLASSIFICATION

Part Number	Version	Oscillation Frequency	Package	Operating Temperature Range
NJW4132U2-A	A	300kHz typ.	SOT-89-5	General Spec. -40°C to +85°C
NJW4132U2-B	B	700kHz typ.	SOT-89-5	General Spec. -40°C to +85°C

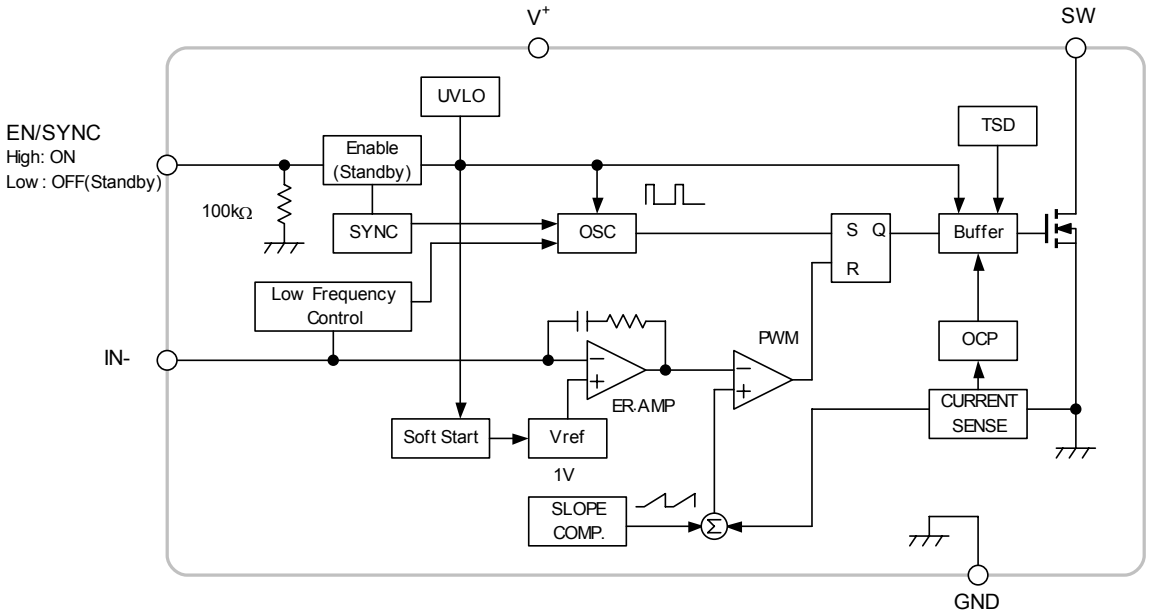
■ PIN CONFIGURATION



PIN FUNCTION
1. SW
2. GND
3. IN-
4. EN/SYNC
5. V^+

NJW4132U2

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Supply Voltage	V^+	+45	V
SW pin Voltage	V_{SW}	+45	V
IN- pin Voltage	V_{IN-}	-0.3 to +6	V
EN/SYNC pin Voltage	$V_{EN/SYNC}$	+45	V
Power Dissipation	P_D	SOT-89-5 625 (*1) 2,400 (*2)	mW
Junction Temperature Range	Tj	-40 to +150	°C
Operating Temperature Range	T_{opr}	-40 to +85	°C
Storage Temperature Range	T_{stg}	-40 to +150	°C

(*1): Mounted on glass epoxy board. (76.2×114.3×1.6mm:based on EIA/JDEC standard size, 2Layers, Cu area 100mm^2)

(*2): Mounted on glass epoxy board. (76.2×114.3×1.6mm:based on EIA/JDEC standard, 4Layers)

(For 4Layers: Applying 74.2×74.2mm inner Cu area and a thermal via hall to a board based on JEDEC standard JESD51-5)

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V^+	4.5	–	40	V
External Clock Input Range					
A version	f_{SYNC}	290	–	500	kHz
B version		690	–	1,000	

■ ELECTRICAL CHARACTERISTICS (Unless otherwise noted, V^+=$V_{EN./SYNC}$=12V, Ta=25°C)

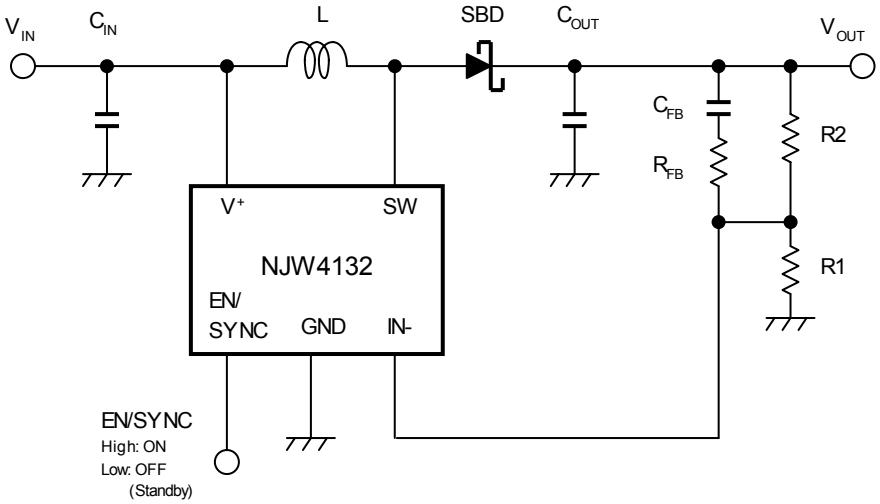
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Under Voltage Lockout Block						
ON Threshold Voltage	V_{T_ON}	V^+= L → H	4.2	4.35	4.5	V
OFF Threshold Voltage	V_{T_OFF}	V^+= H → L	4.1	4.25	4.4	V
Hysteresis Voltage	V_{HYS}		70	100	–	mV
Soft Start Block						
Soft Start Time	T_{SS}	V_B=0.95V	5	10	15	ms
Oscillator Block						
Oscillation Frequency	f_{OSC}	A version, V_{IN-}=0.9V	270	300	330	kHz
		B version, V_{IN-}=0.9V	630	700	770	kHz
Oscillation Frequency OCP operates	f_{OSC_LIM}	A version, V_{IN-}=0.4V	–	50	–	kHz
		B version, V_{IN-}=0.4V	–	117	–	kHz
Oscillation Frequency deviation (Supply voltage)	f_{DV}	V^+=4.5V to 40V	–	1	–	%
Oscillation Frequency deviation (Temperature)	f_{DT}	Ta=-40°C to +85°C	–	5	–	%
Error Amplifier Block						
Reference Voltage	V_B		-1.0%	1.0	+1.0%	V
Input Bias Current	I_B		-0.1	–	+0.1	μA
PWM Comparate Block						
Maximum Duty Cycle	$M_{AX}D_{UTY}$	V_{IN-}=0.9V	85	90	–	%
Minimum ON Time1 (Use Built-in Oscillator)	$t_{ON-min1}$	A version	–	300	425	ns
		B version	–	110	155	ns
Minimum ON Time2 (Use Ext CLK)	$t_{ON-min2}$	A version, f_{SYNC}=400kHz	–	220	355	ns
		B version, f_{SYNC}=800kHz	–	90	125	ns
OCP Block						
COOL DOWN Time	t_{COOL}		–	42	–	ms
Output Block						
Output ON Resistance	R_{ON}	I_{SW}=1A	–	0.4	0.65	Ω
Switching Current Limit	I_{LIM}		1.75	2.1	2.25	A
SW Leak Current	I_{LEAK}	$V_{EN/SYNC}$=0V, V_{SW}=45V	–	–	1	μA

■ ELECTRICAL CHARACTERISTICS (Unless otherwise noted, $V^+=V_{EN/SYNC}$=12V, Ta=25°C)

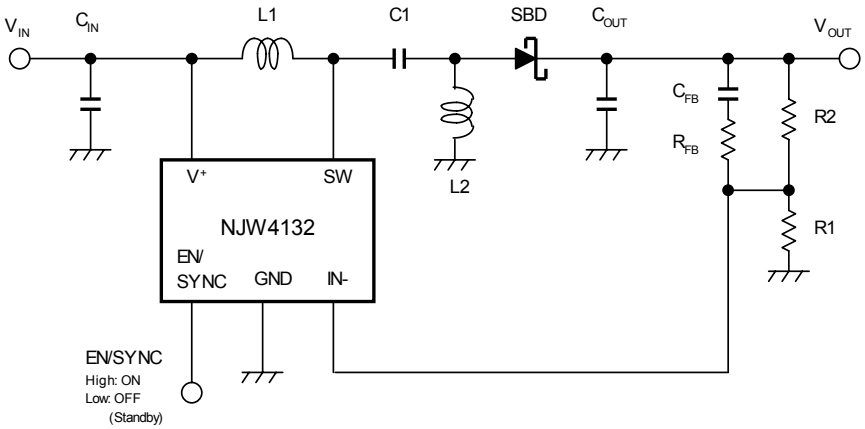
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Standby Control Block						
ON Control Voltage	V_{ON}	$V_{EN/SYNC}$= L → H	1.6	–	V^+	V
OFF Control Voltage	V_{OFF}	$V_{EN/SYNC}$= H → L	0	–	0.5	V
Input Bias Current (EN/SYNC pin)	I_{EN}	$V_{EN/SYNC}$=12V	–	165	300	μA
General Characteristics						
Quiescent Current	I_{DD}	A version, R_L=no load, V_{IN-}=0.9V	–	2.1	2.65	mA
		B version, R_L=no load, V_{IN-}=0.9V	–	2.5	3.0	mA
Standby Current	I_{DD_STB}	$V_{EN/SYNC}$=0V	–	–	1	μA

■ TYPICAL APPLICATIONS

Boost Converter

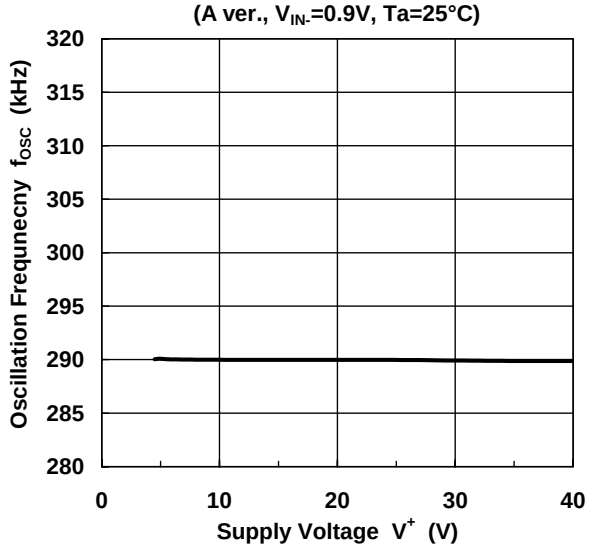


Buck-Boost (SEPIC) Converter

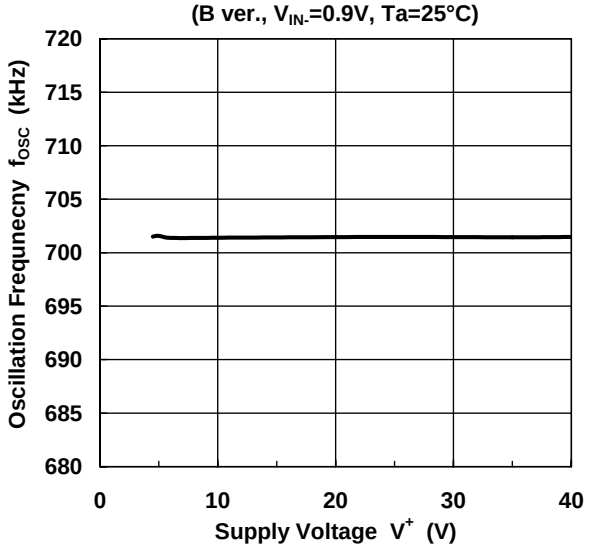


■ TYPICAL CHARACTERISTICS

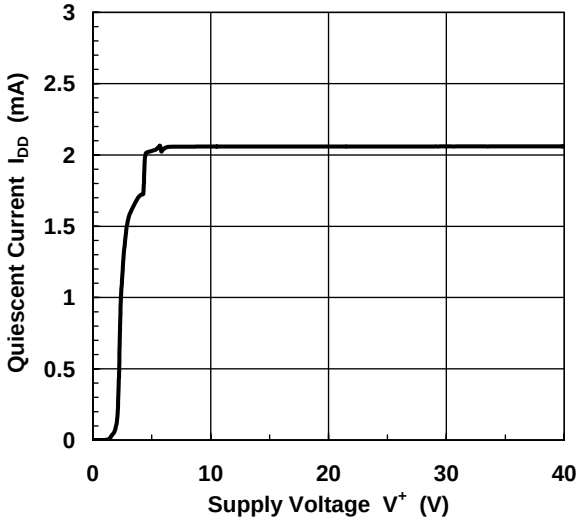
Oscillation Frequency vs. Supply Voltage
(A ver., V_{IN-}=0.9V, Ta=25°C)



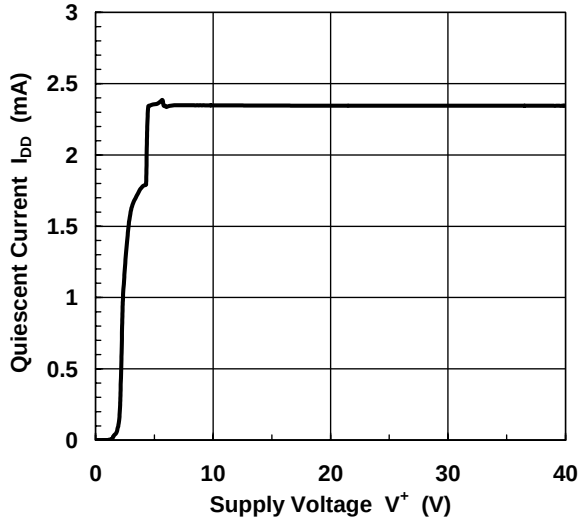
Oscillation Frequency vs. Supply Voltage
(B ver., V_{IN-}=0.9V, Ta=25°C)



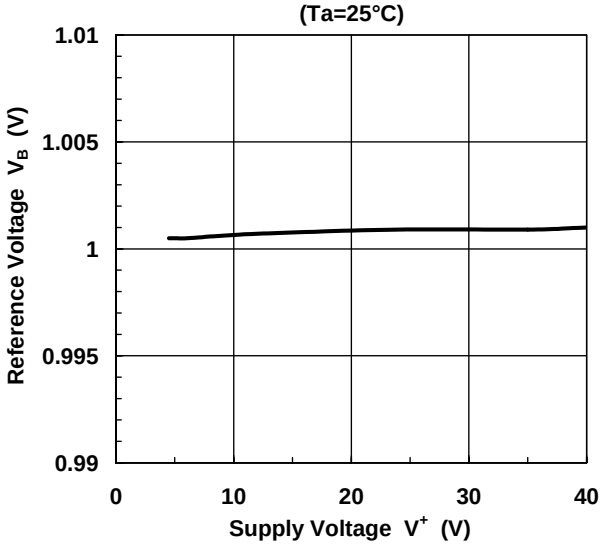
Quiescent Current vs. Supply Voltage
(A ver., R_L=no load, V_{IN-}=0.9V, Ta=25°C)



Quiescent Current vs. Supply Voltage
(B ver., R_L=no load, V_{IN-}=0.9V, Ta=25°C)

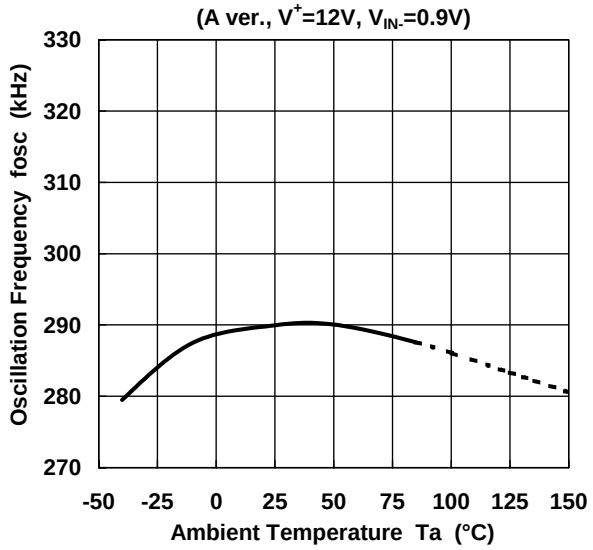


Reference Voltage vs. Supply Voltage
(Ta=25°C)

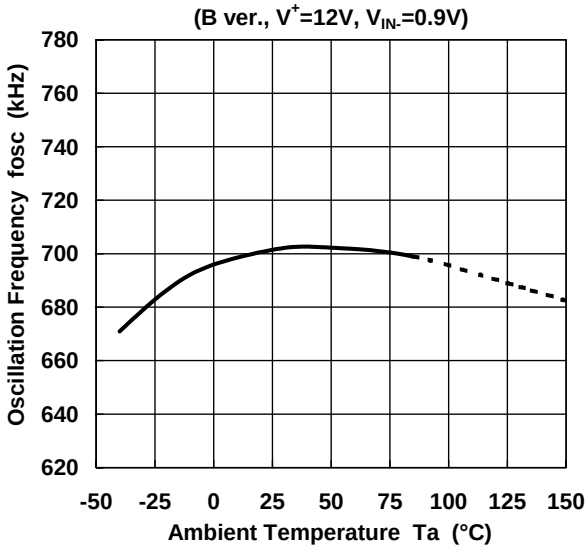


■ TYPICAL CHARACTERISTICS

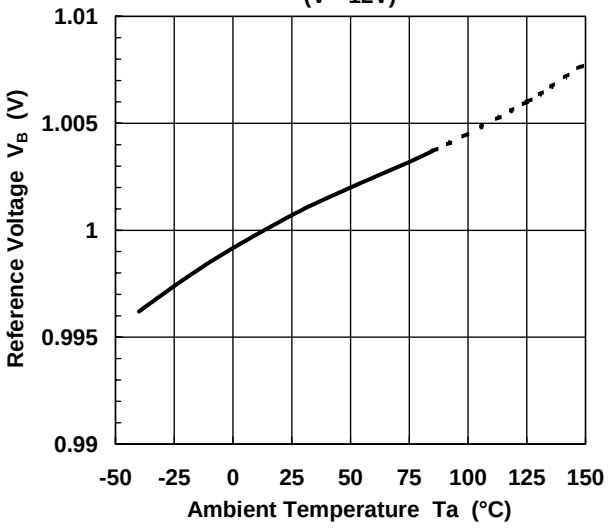
Oscillation Frequency vs Temperature
(A ver., V^+=12V, V_{IN-}=0.9V)



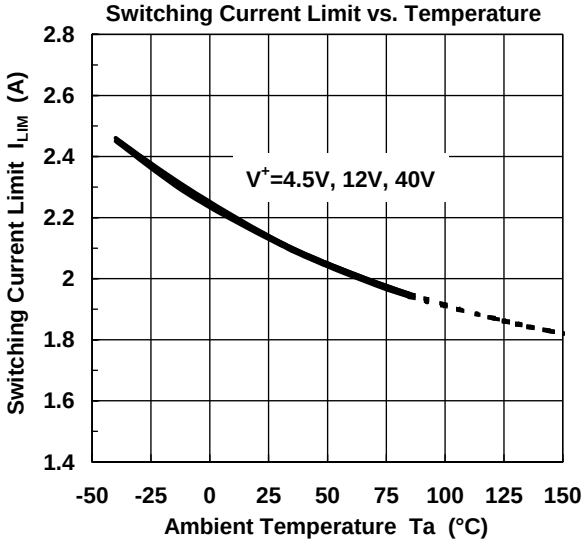
Oscillation Frequency vs Temperature
(B ver., V^+=12V, V_{IN-}=0.9V)



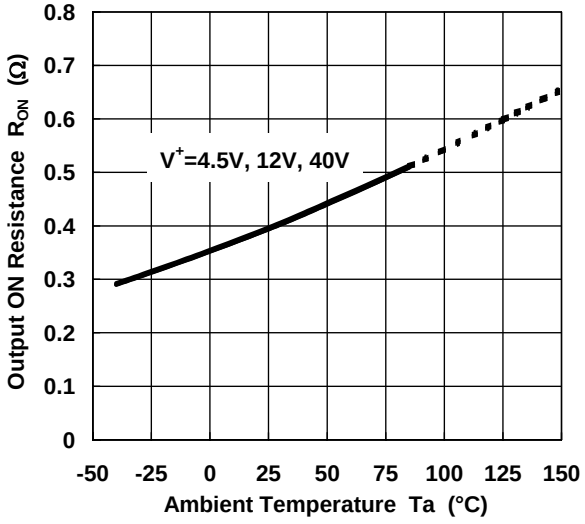
Reference Voltage vs. Temperature
(V^+=12V)



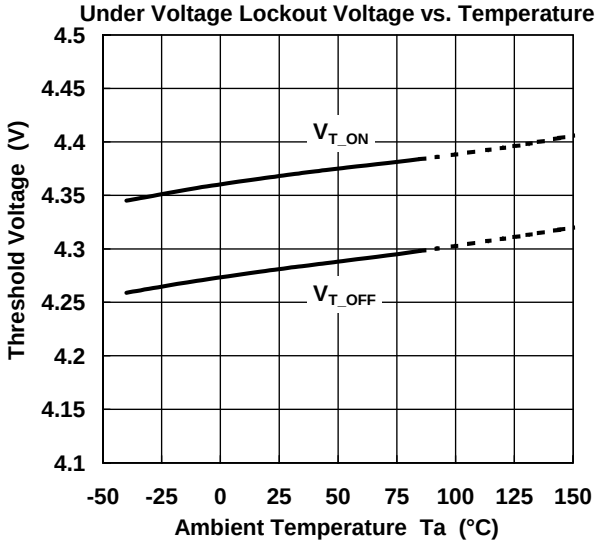
Switching Current Limit vs. Temperature



Output ON Resistance vs. Temperature
(I_{SW}=1A)

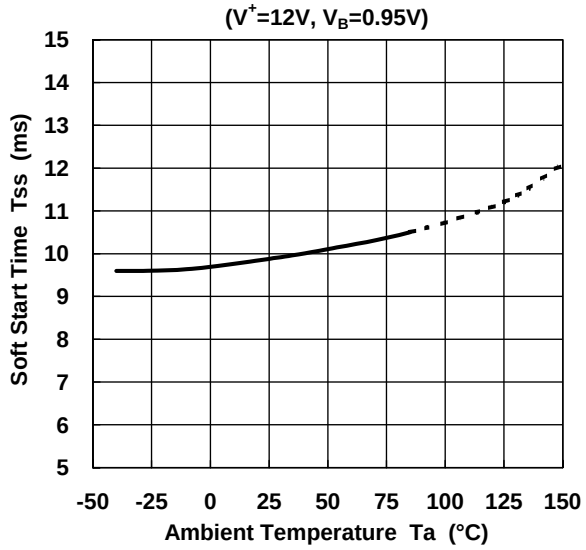


Under Voltage Lockout Voltage vs. Temperature

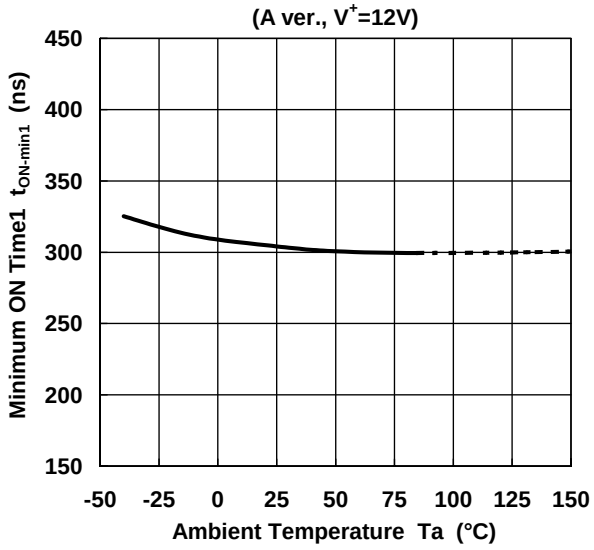


■ TYPICAL CHARACTERISTICS

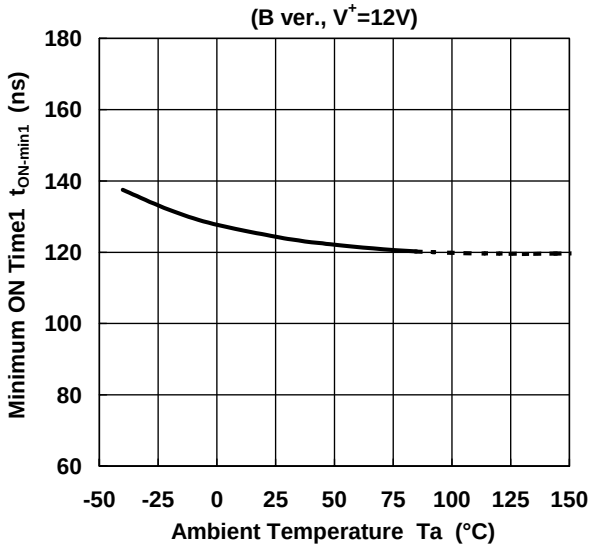
Soft Start Time vs. Temperature
(V^+=12V, V_B=0.95V)



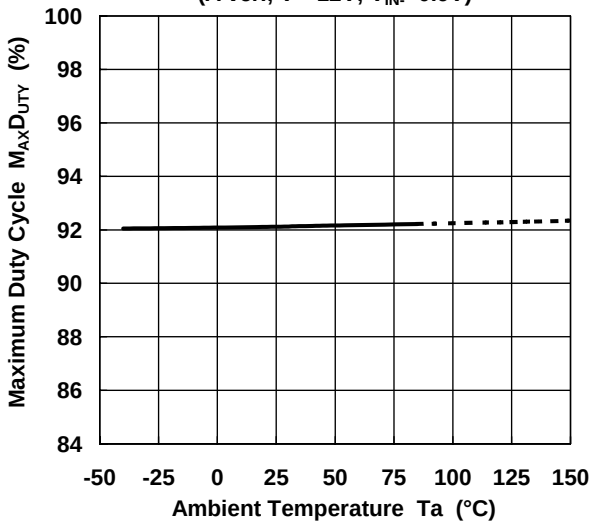
Minimum ON Time1 vs. Temperature
(A ver., V^+=12V)



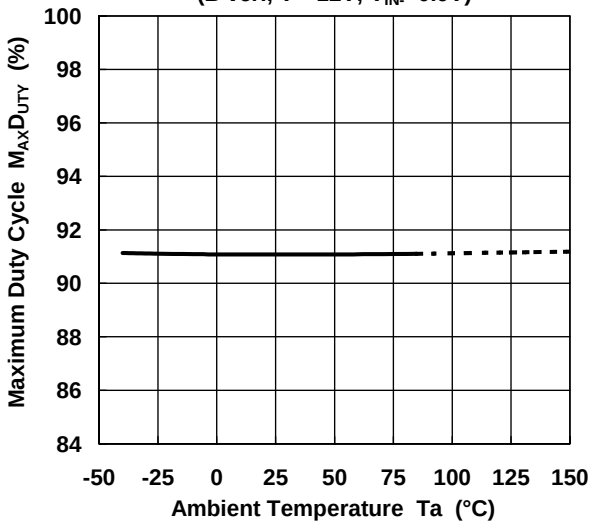
Minimum ON Time1 vs. Temperature
(B ver., V^+=12V)



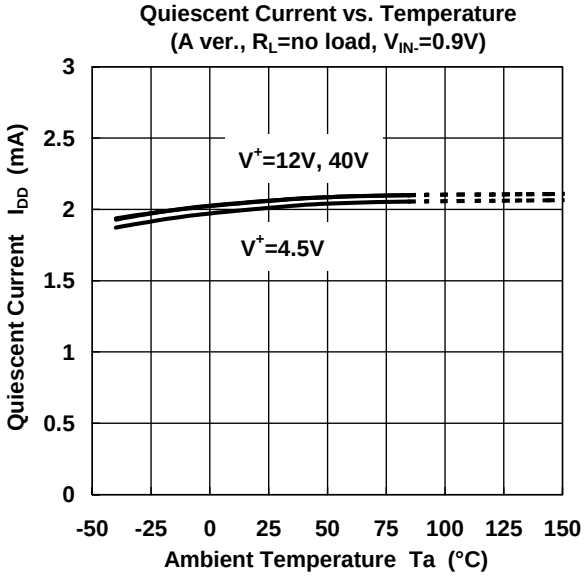
Maximum Duty Cycle vs. Temperature
(A ver., V^+=12V, V_{IN-}=0.9V)

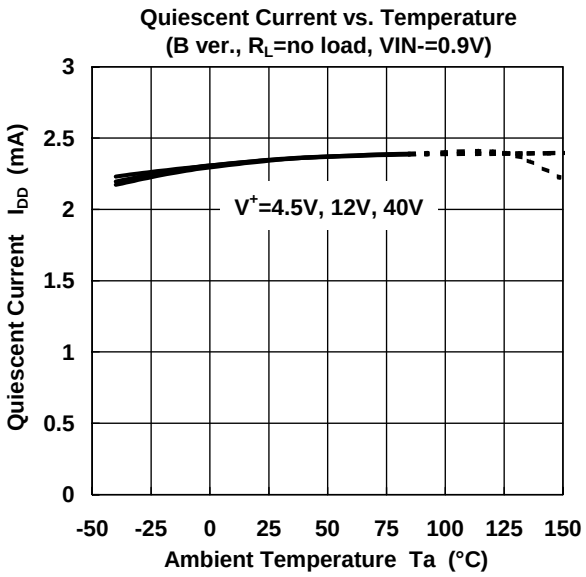


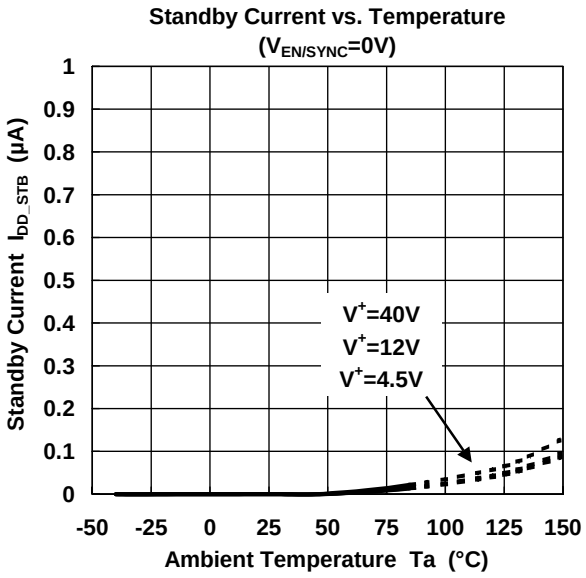
Maximum Duty Cycle vs. Temperature
(B ver., V^+=12V, V_{IN-}=0.9V)

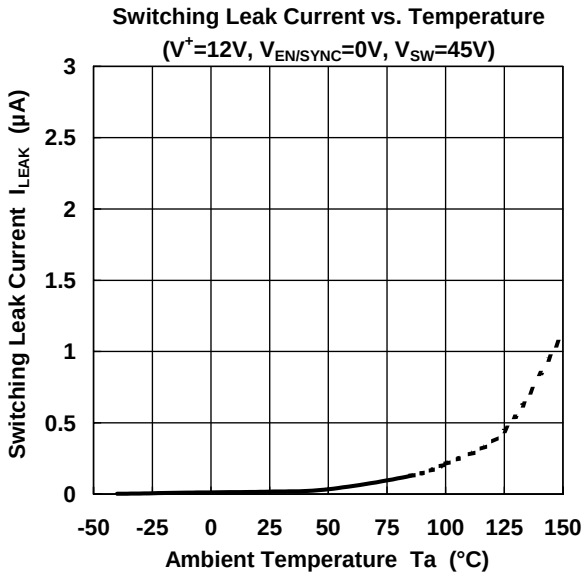


■ TYPICAL CHARACTERISTICS









MEMO

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