

Switching Regulator IC for Boost Converter

Current Mode Control w/ 45V/1.75A MOSFET

■ GENERAL DESCRIPTION

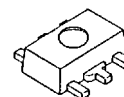
The **NJW4132** is a boost converter with 45V/1.75A MOSFET. It corresponds to high oscillating frequency, and Low ESR Output Capacitor (MLCC) within wide input range from 4.5V to 40V.

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



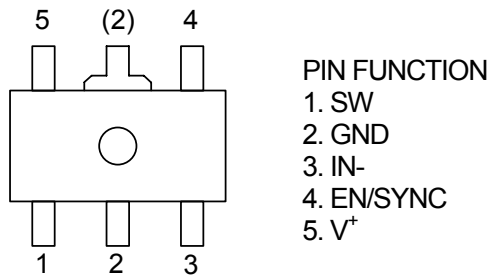
NJW4132U2

■ 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

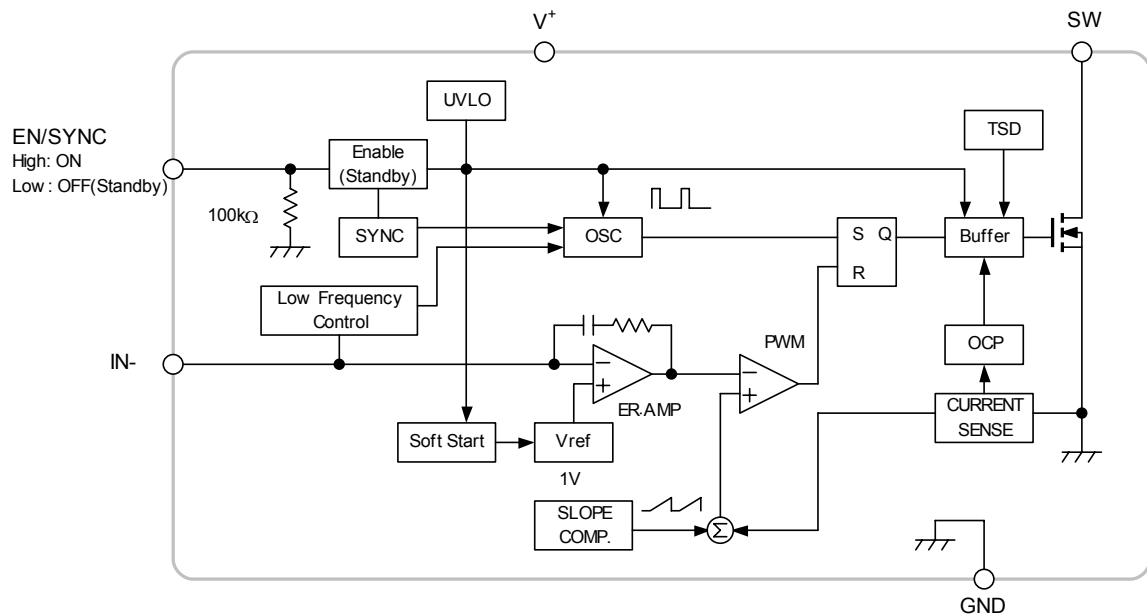
■ PRODUCT CLASSIFICATION

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



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	T_j	-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 100mm²)

(*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, $V^+ = V_{EN/SYNC} = 12V$, $T_a = 25^\circ C$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
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Under Voltage Lockout Block

ON Threshold Voltage	V_{T_ON}	$V^+ = L \rightarrow H$	4.2	4.35	4.5	V
OFF Threshold Voltage	V_{T_OFF}	$V^+ = H \rightarrow L$	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
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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}	$T_a = -40^\circ C$ to $+85^\circ C$	–	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 Compare Block

Maximum Duty Cycle	M_{AXD_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
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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, $V^+ = V_{\text{EN/SYNC}} = 12\text{V}$, $T_a = 25^\circ\text{C}$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
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Standby Control Block

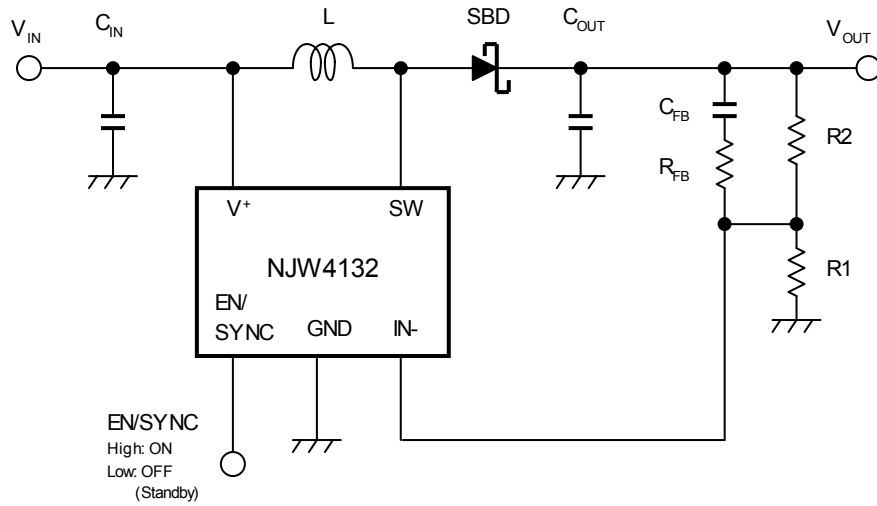
ON Control Voltage	V_{ON}	$V_{\text{EN/SYNC}} = \text{L} \rightarrow \text{H}$	1.6	—	V^+	V
OFF Control Voltage	V_{OFF}	$V_{\text{EN/SYNC}} = \text{H} \rightarrow \text{L}$	0	—	0.5	V
Input Bias Current (EN/SYNC pin)	I_{EN}	$V_{\text{EN/SYNC}} = 12\text{V}$	—	165	300	μA

General Characteristics

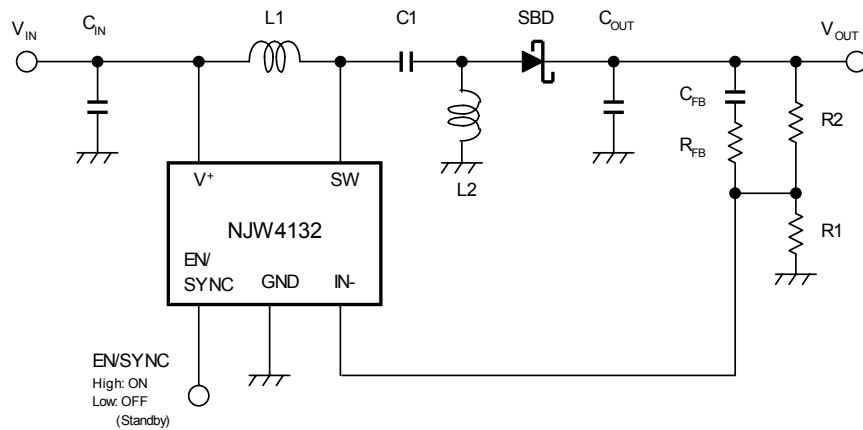
Quiescent Current	I_{DD}	A version, $R_L = \text{no load}$, $V_{\text{IN}} = 0.9\text{V}$	—	2.1	2.65	mA
		B version, $R_L = \text{no load}$, $V_{\text{IN}} = 0.9\text{V}$	—	2.5	3.0	mA
Standby Current	$I_{\text{DD_STB}}$	$V_{\text{EN/SYNC}} = 0\text{V}$	—	—	1	μA

■ TYPICAL APPLICATIONS

Boost Converter

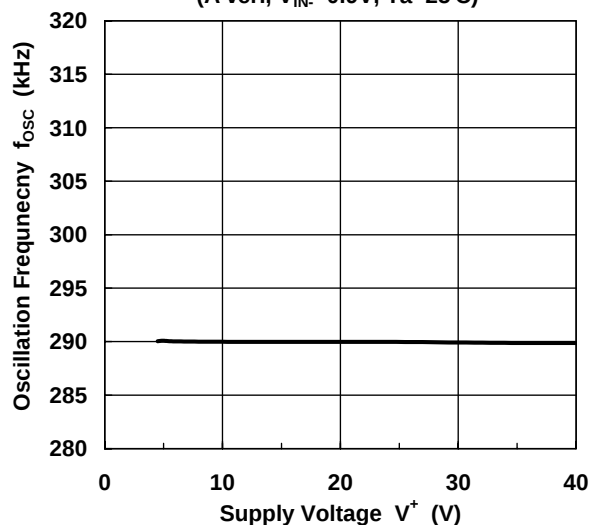


Buck-Boost (SEPIC) Converter

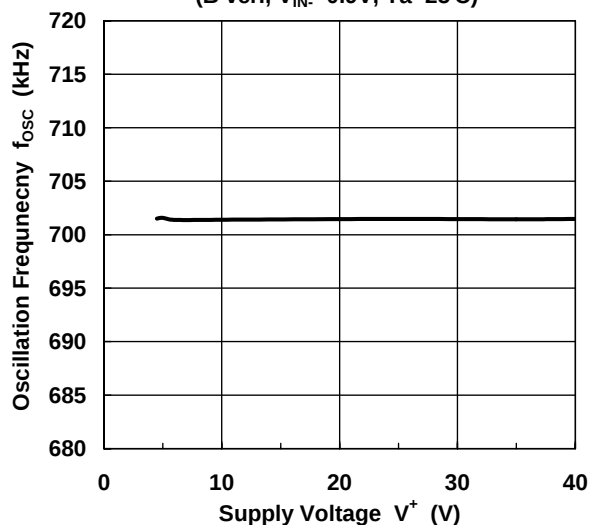


■ TYPICAL CHARACTERISTICS

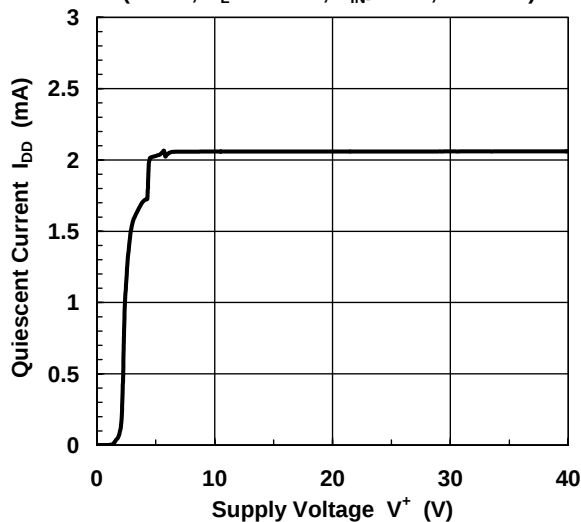
Oscillation Frequency vs. Supply Voltage
(A ver., $V_{IN}=0.9V$, $T_a=25^\circ C$)



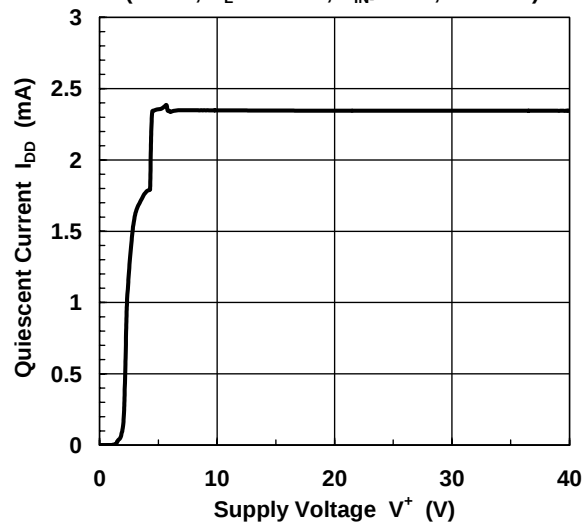
Oscillation Frequency vs. Supply Voltage
(B ver., $V_{IN}=0.9V$, $T_a=25^\circ C$)



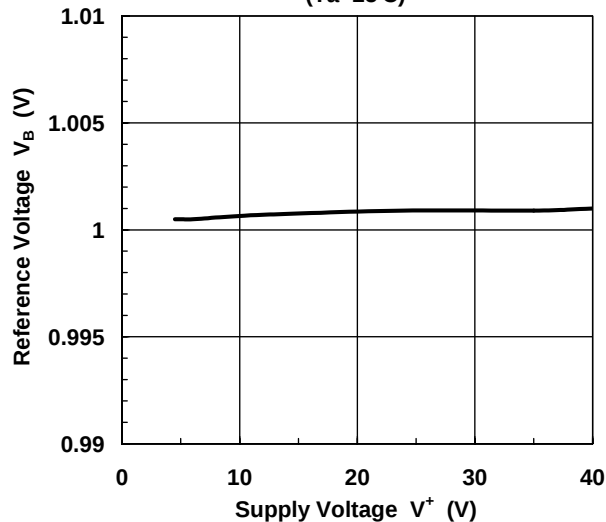
Quiescent Current vs. Supply Voltage
(A ver., $R_L=no\ load$, $V_{IN}=0.9V$, $T_a=25^\circ C$)



Quiescent Current vs. Supply Voltage
(B ver., $R_L=no\ load$, $V_{IN}=0.9V$, $T_a=25^\circ C$)

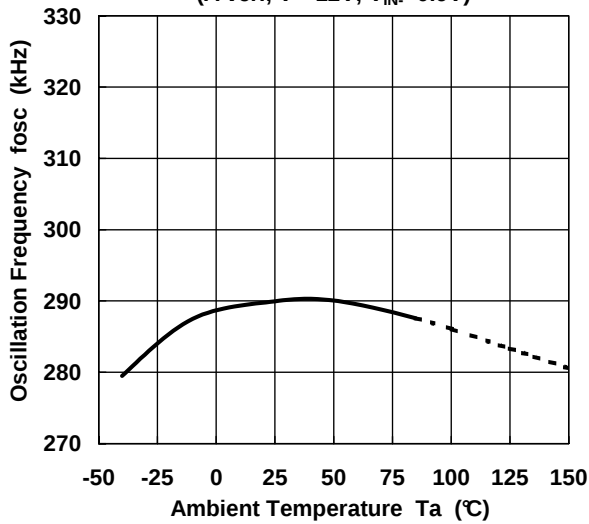


Reference Voltage vs. Supply Voltage
($T_a=25^\circ C$)

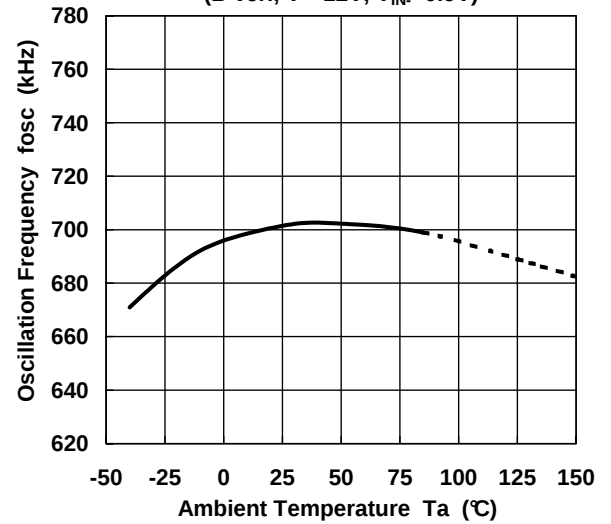


■ TYPICAL CHARACTERISTICS

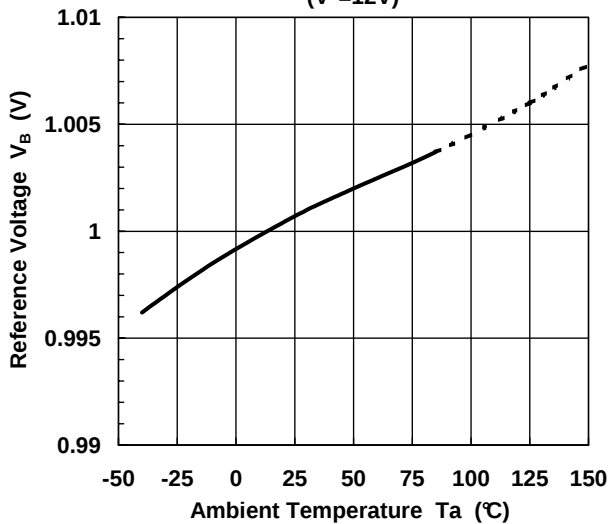
Oscillation Frequency vs Temperature
(A ver., $V^+=12V$, $V_{IN-}=0.9V$)



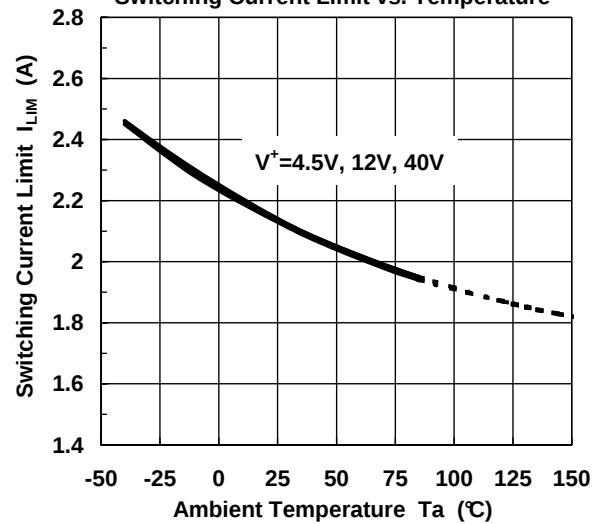
Oscillation Frequency vs Temperature
(B ver., $V^+=12V$, $V_{IN-}=0.9V$)



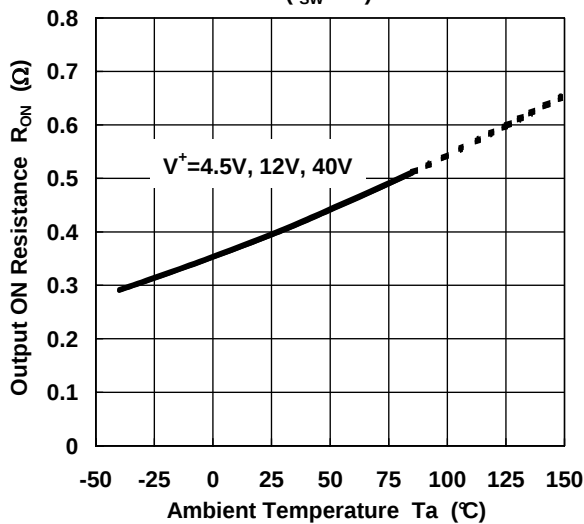
Reference Voltage vs. Temperature
($V^+=12V$)



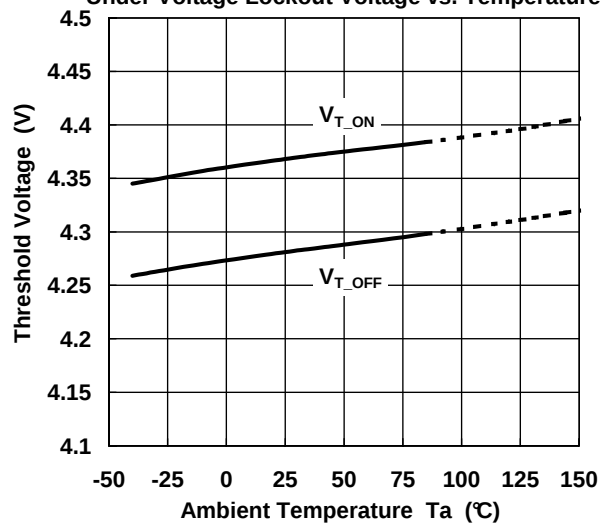
Switching Current Limit vs. Temperature



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

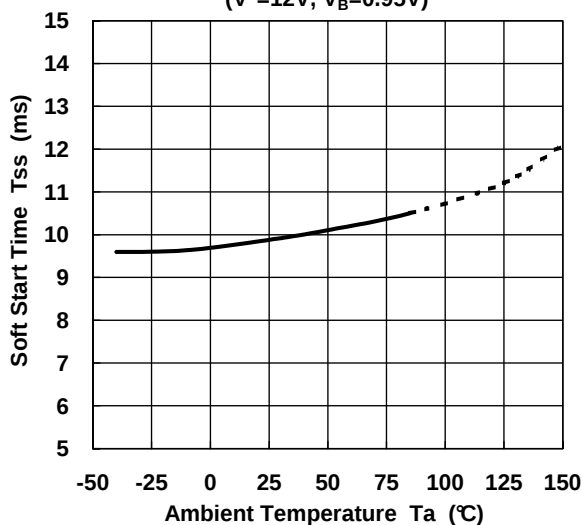


Under Voltage Lockout Voltage vs. Temperature

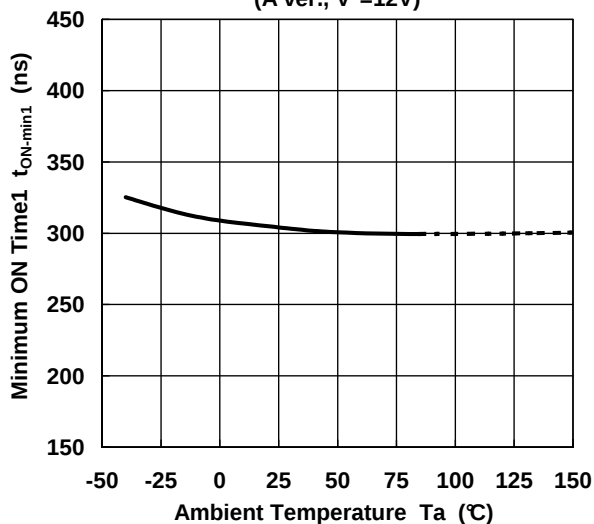


■ TYPICAL CHARACTERISTICS

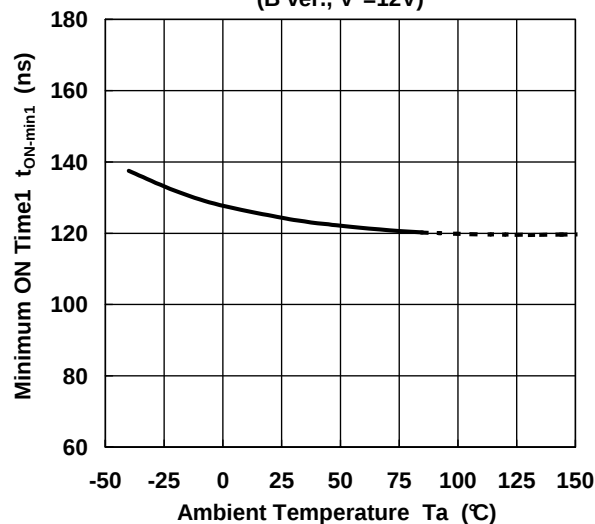
Soft Start Time vs. Temperature
($V^+=12V$, $V_B=0.95V$)



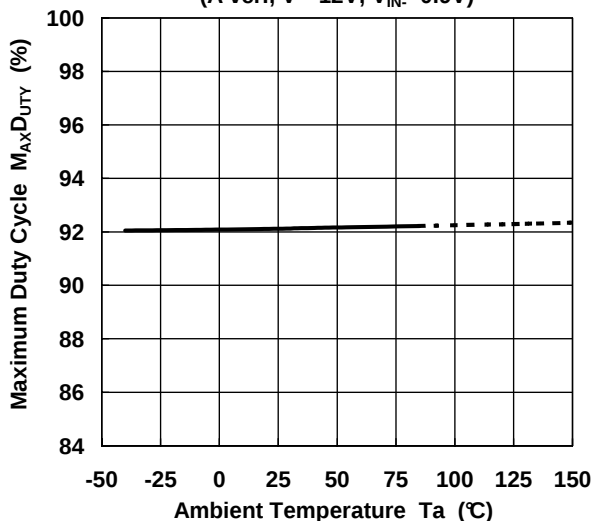
Minimum ON Time1 vs. Temperature
(A ver., $V^+=12V$)



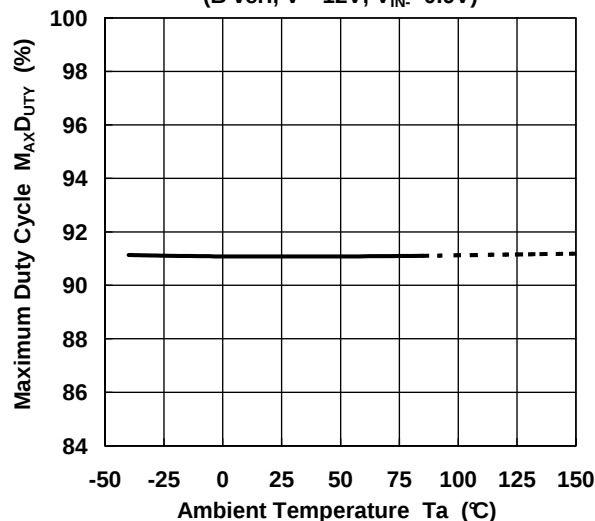
Minimum ON Time1 vs. Temperature
(B ver., $V^+=12V$)



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

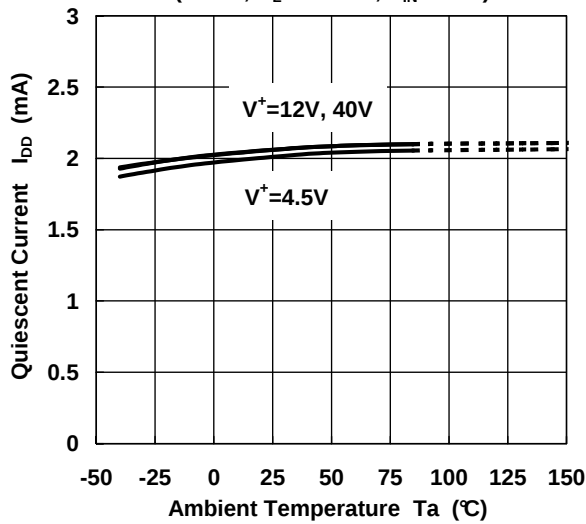


Maximum Duty Cycle vs. Temperature
(B ver., $V^+=12V$, $V_{IN}=0.9V$)

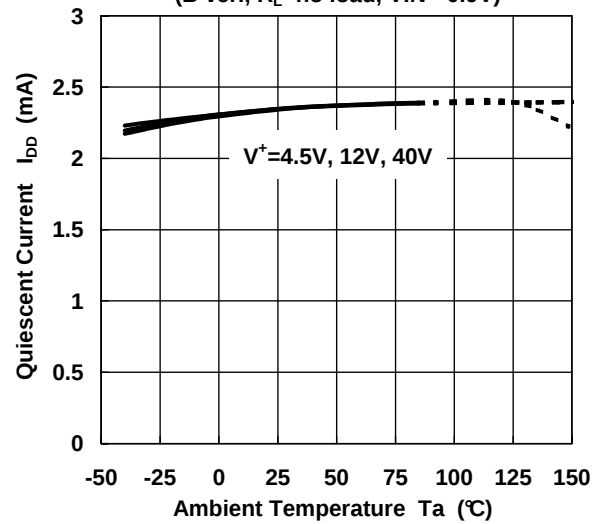


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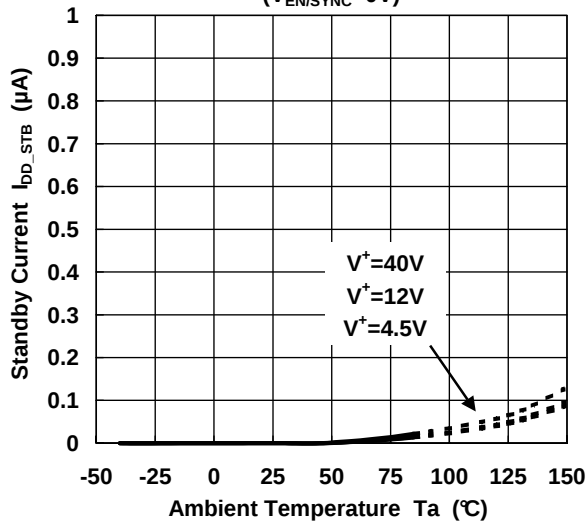
Quiescent Current vs. Temperature
(A ver., R_L =no load, V_{IN} =0.9V)



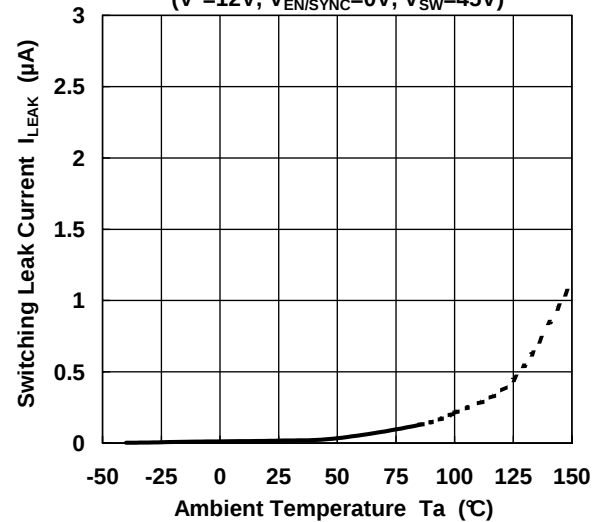
Quiescent Current vs. Temperature
(B ver., R_L =no load, V_{IN} =0.9V)



Standby Current vs. Temperature
($V_{EN/SYNC}$ =0V)



Switching Leak Current vs. Temperature
($V^+=12V$, $V_{EN/SYNC}$ =0V, V_{SW} =45V)



MEMO

[CAUTION]

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