Switching Regulator IC for Buck Converter

Current Mode Control w/ 40V/8A MOSFET

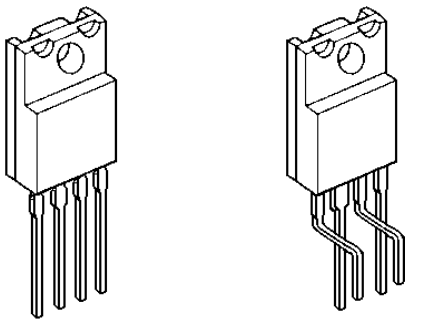
■ GENERAL DESCRIPTION

The **NJW4158** is a current mode controlled buck converter with **40V/8A MOSFET** that operates wide input range from 6V to 35V. The **NJW4158** can realize a buck converter with minimal external components that it includes compensation circuit.

The **NJW4158** is able to stable startup by soft start function. Also, it has over current protection and thermal shutdown circuit.

It is suitable for supplying power to an Office Automation Equipment, Industrial Instrument, Amusement, Wireless Base Station Applications and so on.

■ PACKAGE OUTLINE



1 2 3 4

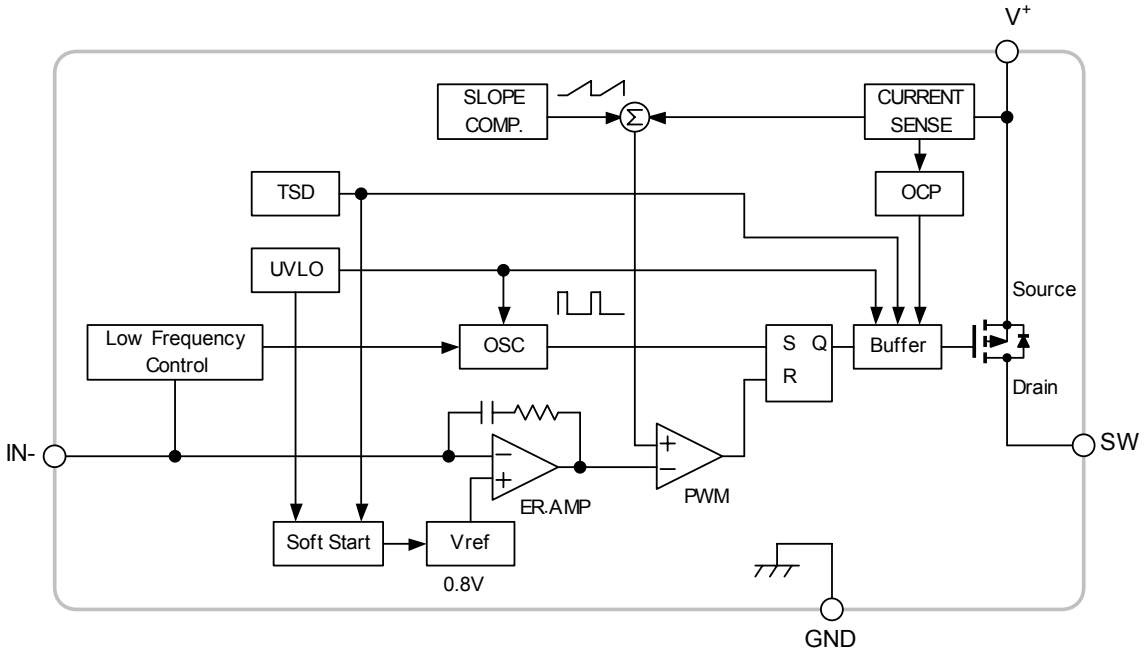
NJW4158F **NJW4158FL**

PIN CONFIGURATION
1. V^+
2. SW
3. GND
4. IN-

■ FEATURES

- Current Mode Control
- Wide Input Range: 6V to 40V
- Switching Current 10.5A min.
- PWM Control
- Built-in Compensation Circuit
- Oscillating Frequency: 150kHz typ.
- Soft Start Function 10ms typ.
- UVLO (Under Voltage Lockout)
- Over Current Protection
- Thermal Shutdown Function
- Package Outline TO-220F-4pin

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Supply Voltage	V^+	+45	V
Drain – Source pin Voltage	V_{DSS}	-50	V
IN- pin Voltage	V_{IN-}	-0.3 to +6	V
Power Dissipation	P_D	2.1 (Device itself)	W
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

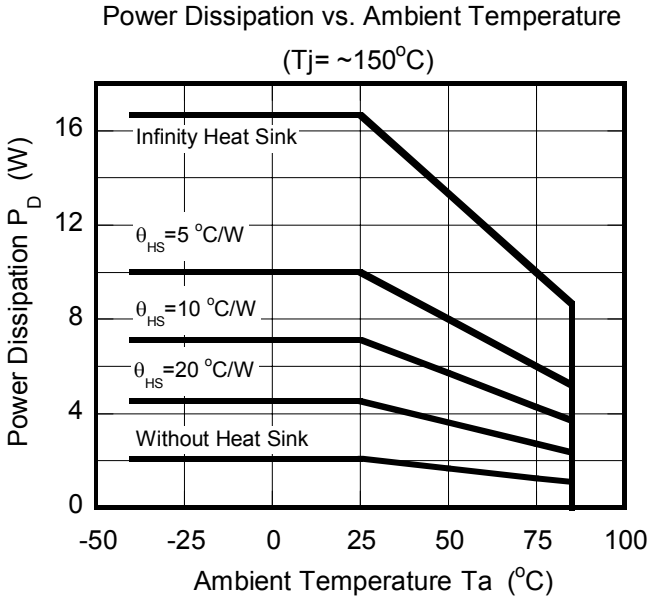
■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V^+	6	12	40	V
IN- pin Voltage	V_{IN-}	0	–	5.5	V

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	THERMAL RESISTANCE	UNIT
Junction-to-Ambient Temperature	θja	59.5	°C/W
Junction-to-Case	ψjt	7.5	°C/W

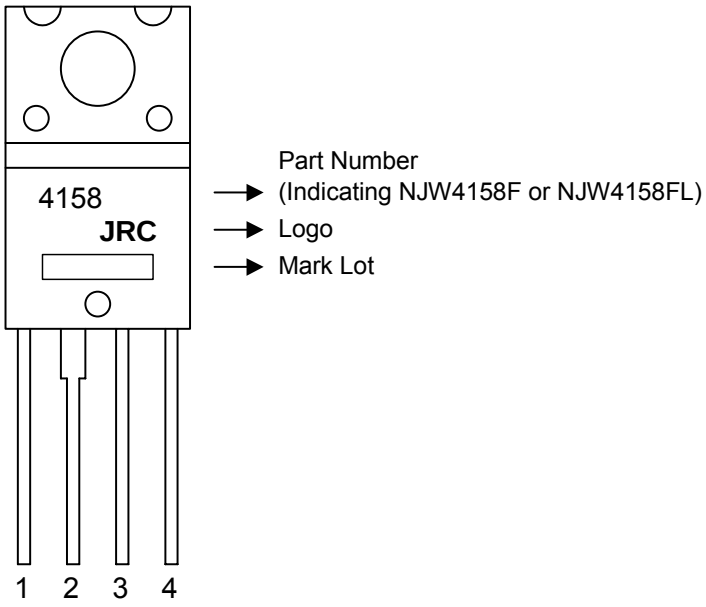
■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



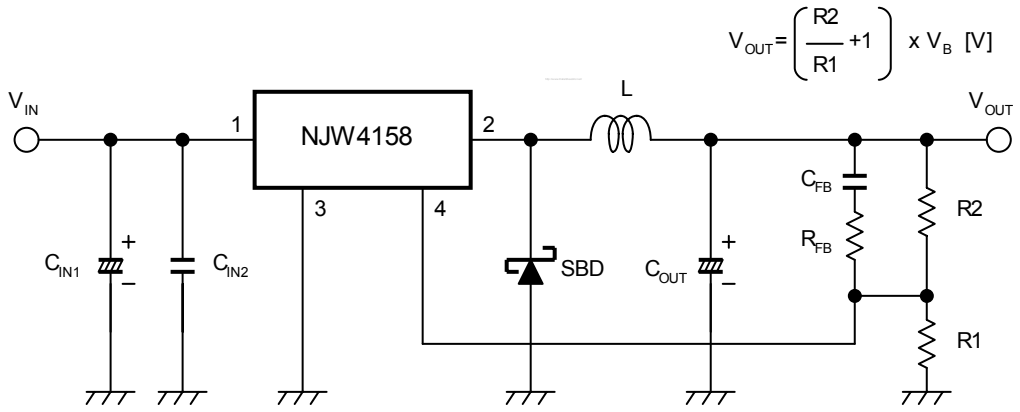
■ ELECTRICAL CHARACTERISTICS (Unless otherwise noted, V^+=12V, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Under Voltage Lockout Block						
ON Threshold Voltage	V_{T_ON}	V^+= L → H	5.2	5.4	5.6	V
OFF Threshold Voltage	V_{T_OFF}	V^+= H → L	4.4	4.6	4.8	V
Hysteresis Voltage	V_{HYS}		400	800	–	mV
Soft Start Block						
Soft Start Time	T_{SS}	V_B=0.75V	5	10	20	ms
Oscillator Block						
Oscillation Frequency	f_{OSC}	V_{IN-}=0.7V	135	150	165	kHz
Oscillation Frequency (Low Frequency Control)	f_{OSC_LOW}	V_{IN-}=0.4V	–	50	–	kHz
Oscillation Frequency deviation (Supply voltage)	f_{DV}	V^+=6V 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%	0.8	+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-}=0.7V	85	90	–	%
Minimum ON Time	T_{ON_min}		–	660	850	ns
Over Current Protection						
Cool Down Time	t_{COOL}		–	24	–	ms
Output Block						
Output ON Resistance	R_{ON}	I_{SW}=8A	–	55	80	mΩ
Switching Current Limit	I_{LIM}		10.5	12.5	15	A
Switching Current Limit 2	I_{LIM2}	V^+=30V	10.5	12.5	15	A
Switching Leak Current	I_{LEAK}	V^+=45V, V_{SW}=0V	–	–	20	μA
General Characteristics						
Quiescent Current	I_{DD}	R_L=no load, V_{IN-}=0.7V	–	7	9.5	mA

■ MARK SPECIFICATION



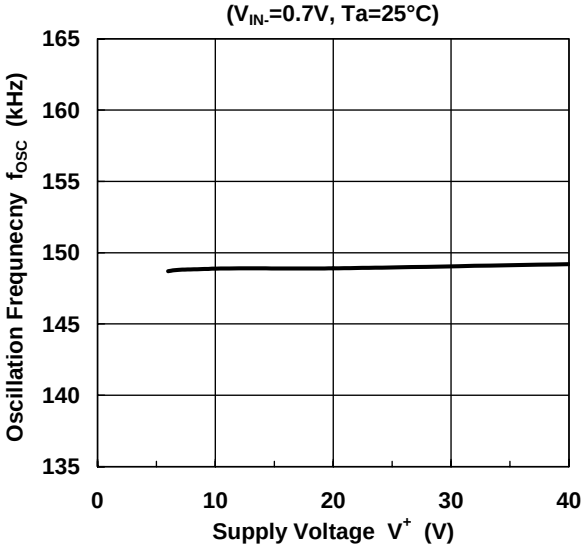
■ TYPICAL APPLICATIONS



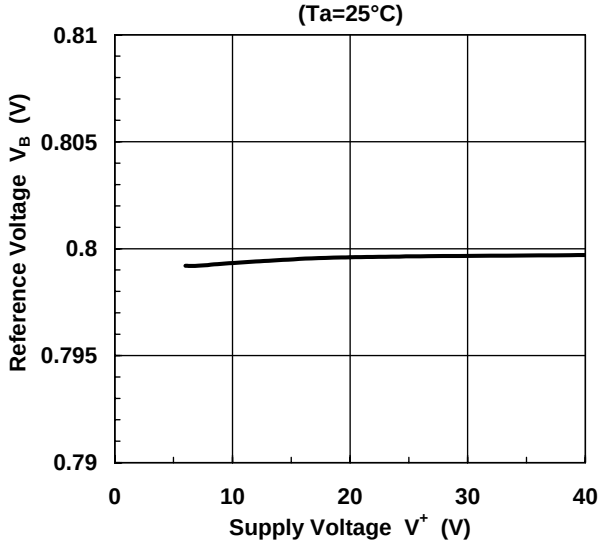
*When large current flows, V_{IN} line may be unstable. Therefore, you should put C_{IN} on near IC as much as possible.

■ TYPICAL CHARACTERISTICS

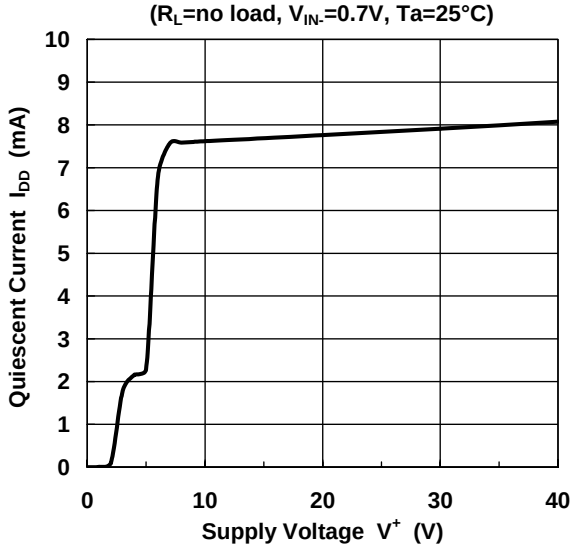
Oscillation Frequency vs. Supply Voltage
(V_{IN-}=0.7V, Ta=25°C)



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

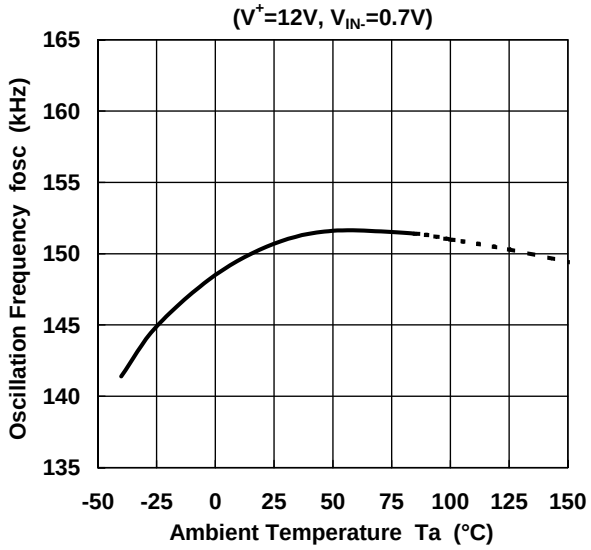


Quiescent Current vs. Supply Voltage
(R_L=no load, V_{IN-}=0.7V, Ta=25°C)

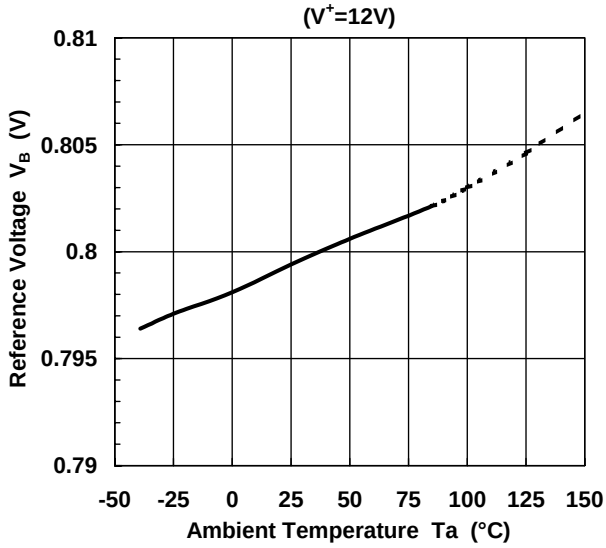


■ TYPICAL CHARACTERISTICS

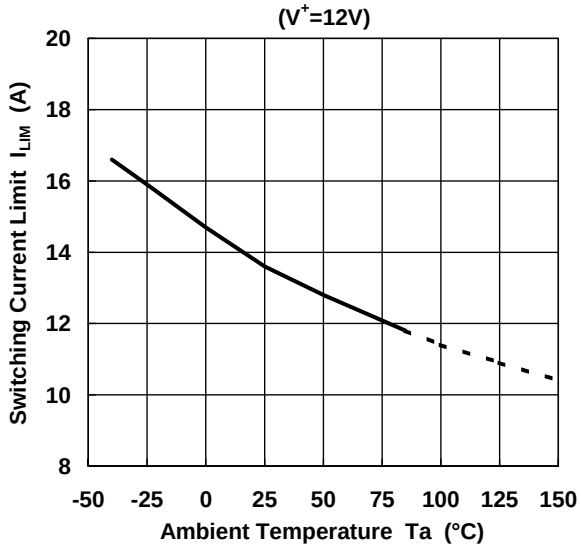
Oscillation Frequency vs Temperature
(V^+=12V, V_{IN-}=0.7V)



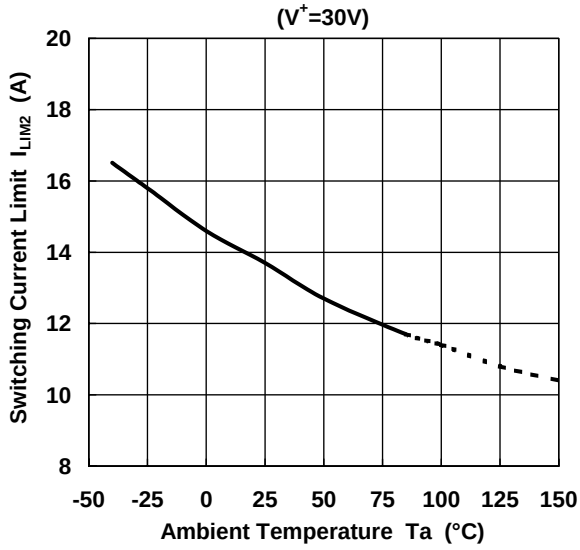
Reference Voltage vs. Temperature
(V^+=12V)



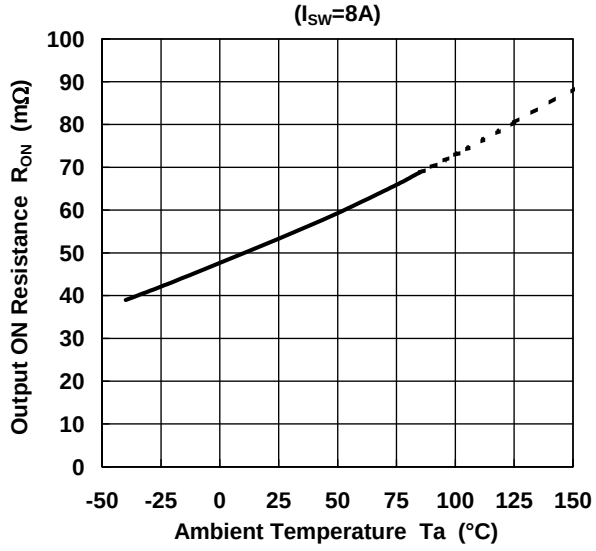
Switching Current Limit vs. Temperature
(V^+=12V)



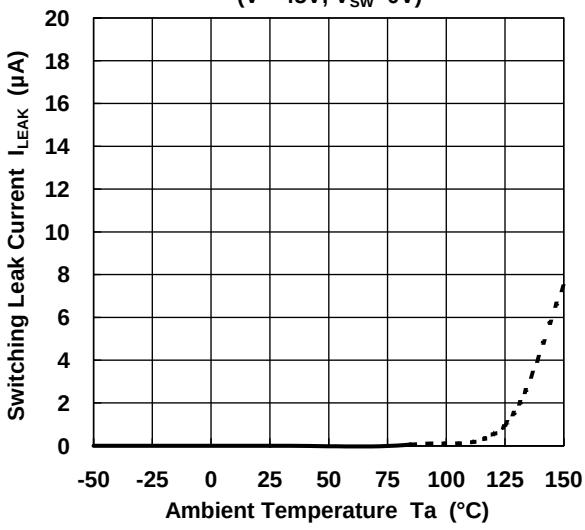
Switching Current Limit 2 vs. Temperature
(V^+=30V)



Output ON Resistance vs. Temperature
(I_{SW}=8A)

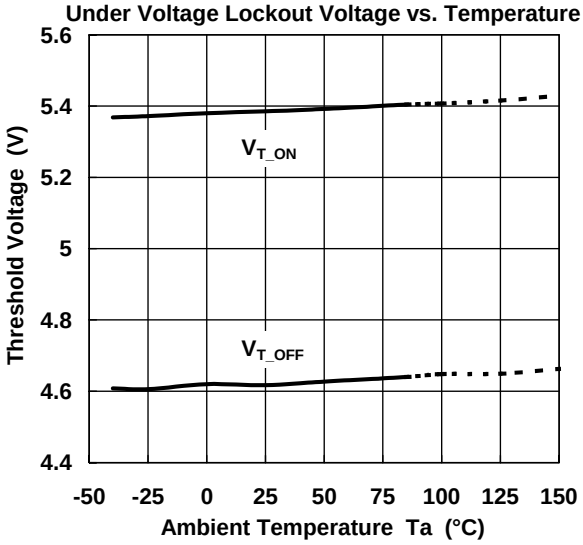


Switching Leak Current vs. Temperature
(V^+=45V, V_{SW}=0V)

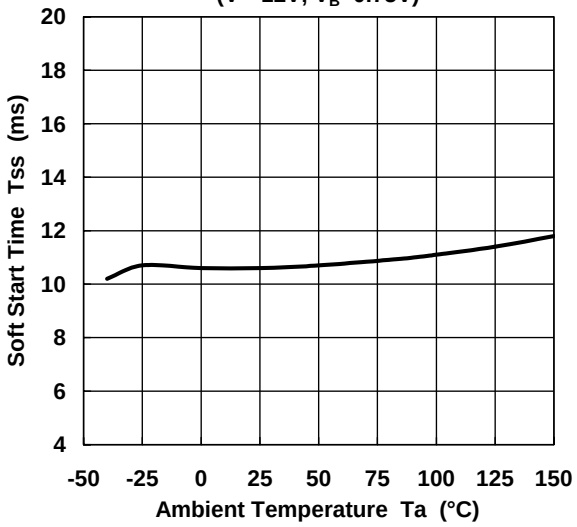


■ TYPICAL CHARACTERISTICS

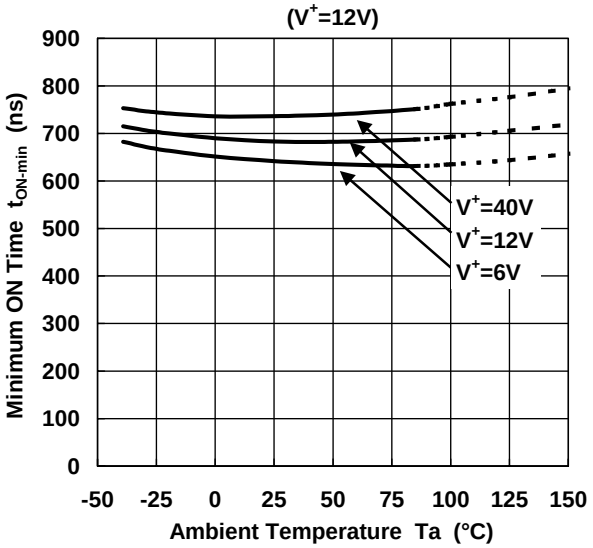
Under Voltage Lockout Voltage vs. Temperature



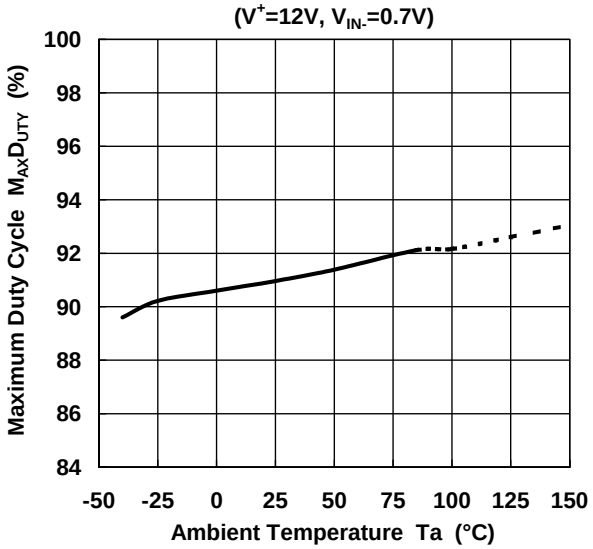
Soft Start Time vs. Temperature
(V^+=12V, V_B=0.75V)



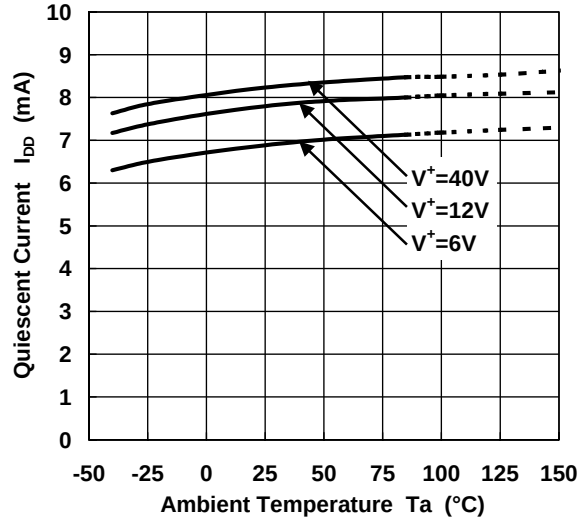
Minimum ON Time vs. Temperature
(V^+=12V)



Maximum Duty Cycle vs. Temperature
(V^+=12V, V_{IN-}=0.7V)



Quiescent Current vs. Temperature
(R_L=no load, V_{IN-}=0.7V)



MEMO

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