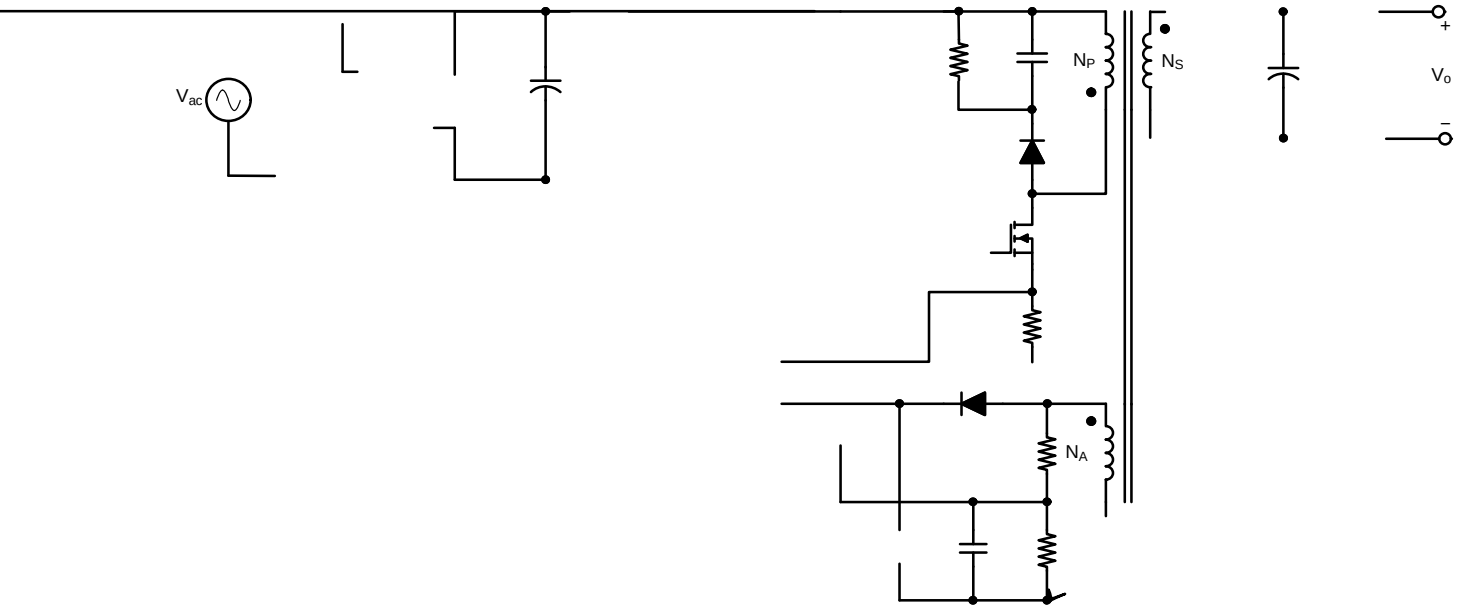

Vac
NP
NS
NA
+
Vo
–

PIN DESCRIPTION

Pin #	Name	Description
1	CS	*Current Sense.* This pin connects to a current−sense resistor to detect the MOSFET current for Peak−Current−Mode control for output regulation. The current−sense information is also used to estimate the output current for CC regulation.
2	GND	*Ground*
3	GATE	*PWM Signal Output.* This pin has an internal totem−pole output driver to drive the power MOSFET. The gate driving voltage is internally clamped at 7.5 V.
4	VDD	*Power Supply.* IC operating current and MOSFET driving current are supplied through this pin. This pin is typically connected to an external V_{DD} capacitor.
5	VS	*Voltage Sense.* This pin detects the output voltage information and diode current discharge time based on the voltage of auxiliary winding. It also senses sink current through the auxiliary winding to detect input voltage information.
6	AUX	*Auxiliary Function.* This pin generates one voltage level proportional to output current to compensate output voltage drop due to cable resistance. The pin is also used for startup with external HV FET. Integrated Dynamic Response Enhancement (DRE) function through secondary feedback signal.

MAXIMUM RATINGS (Note 1, 2, 3)

Parameter	Symbol	Min	Max	Unit
DC Supply Voltage	V_{VDD}	−0.3	30	V
AUX Pin Input Voltage	V_{AUX}	−0.3	30	V
VS Pin Input Voltage	V_{VS}	−0.3	6.0	V
CS Pin Input Voltage	V_{CS}	−0.3	6.0	V

Power Dissipation (T_A =15rlï

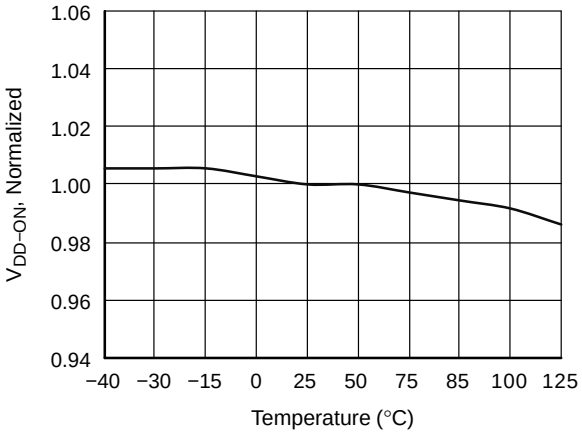
ELECTRICAL CHARACTERISTICS (V_{DD} = 12 V and T_A = −40~85°C unless noted)

Parameter	Test Condition	Symbol	Min	Typ	Max	Unit
VDD SECTION						
Turn−On Threshold Voltage		V_{DD-ON}	16.5	17.5	18.5	V
Turn−Off Threshold Voltage		V_{DD-OFF}	6.1	6.5	6.9	V
V_{DD} Over−Voltage−Protection Level		V_{DD-OVP}	26.5	28.0	29.5	V
V_{DD} Over−Voltage−Protection De−bounce Time		$t_{D-VDD-OVP}$	−	120	200	μs
Startup Current (Note 5)		I_{DD-ST}	−	−	20	μA
Operating Current		I				

ELECTRICAL CHARACTERISTICS (V_{DD} = 12 V and T_A = −40~85°C unless noted) (continued)

Parameter	Test Condition	Symbol	Min	Typ	Max	Unit
NO LOAD CONTROL SECTION						
Deep Green Mode Entry Threshold Voltage of COMV (Note 4)		$V_{COMV-CV-DPGN-ENTRY}$	0.4	0.5	0.6	V
Criteria to Enter Deep Green Mode		$V_{VS\_EAV\_Hi}$	2.550	2.600	2.650	V
Deep Green Mode Band−Band Control High Threshold Voltage		$V_{VS-EAV-H}$	−			

TYPICAL PERFORMANCE CHARACTERISTICS



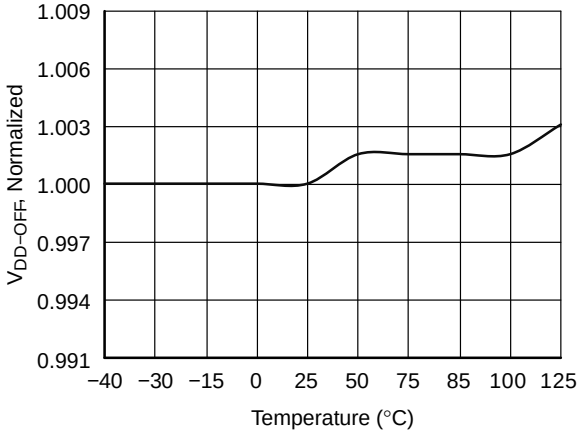
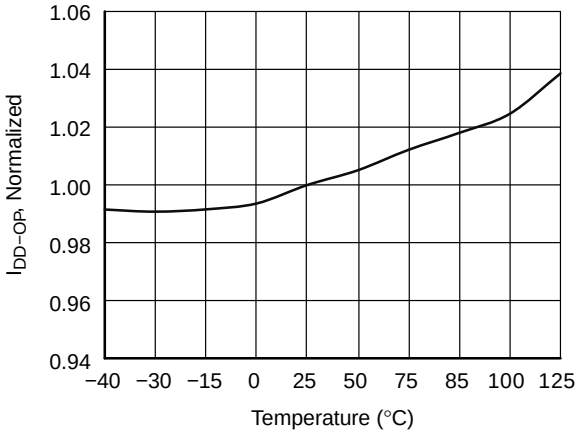
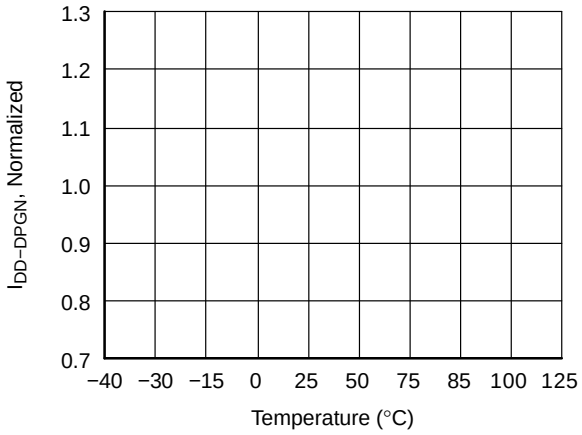
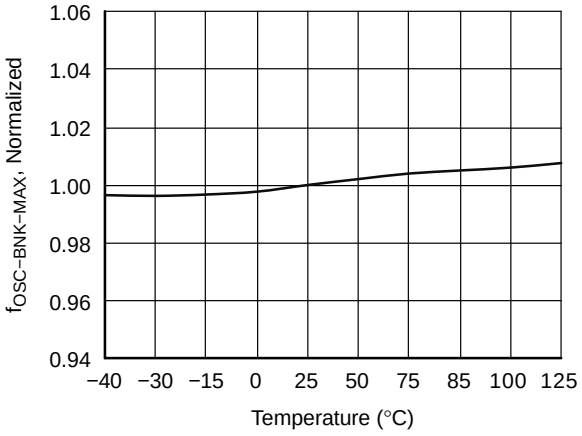
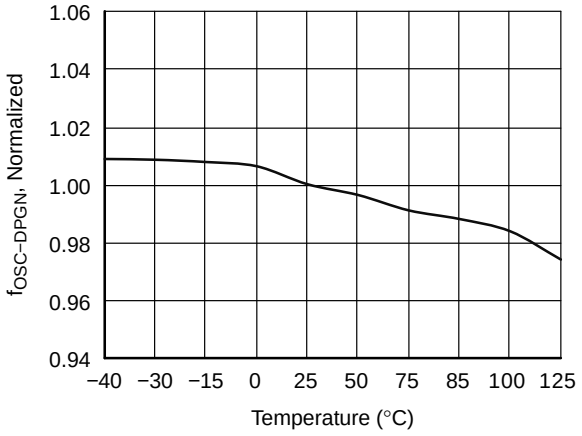


Figure 3. Turn On Threshold V6.5827 0 TD0 Tc0 Tw80ef5 TJTT2 1 (1.02)TJ 2.7071 TD(1.04)TJ 2.7142 TD(1.06)TJTT3 1 Tf1.7433 17.23

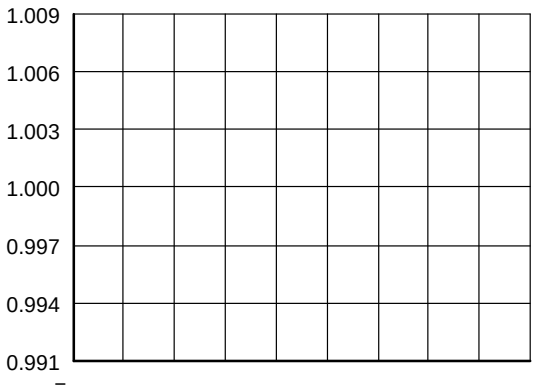








TYPICAL PERFORMANCE CHARACTERISTICS (continued)



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

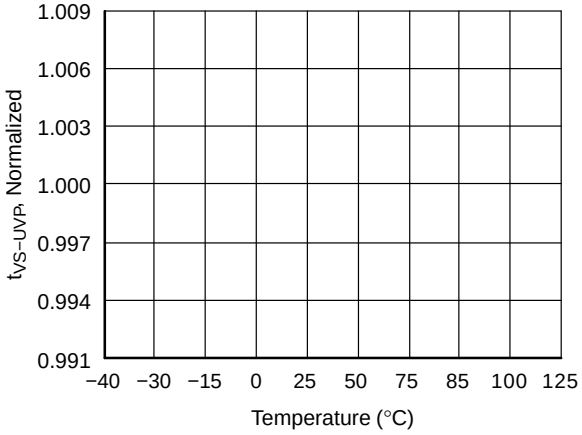


Figure 21. Blanking Time of VSUVP ($t_{VS\ UVP}$) vs. Temperature

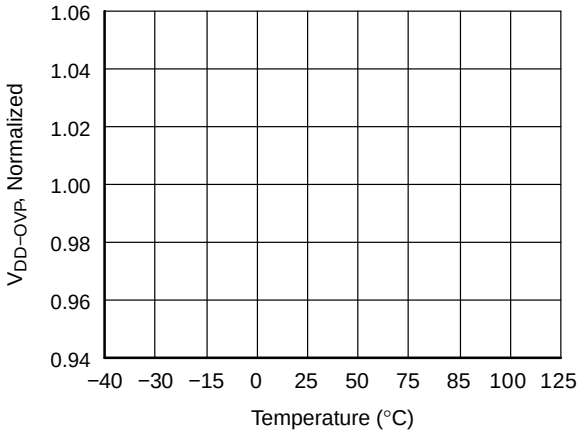


Figure 22. VDD Over Voltage Protection Threshold ($V_{DD\ OVP}$) vs. Temperature

FUNCTIONAL DESCRIPTION

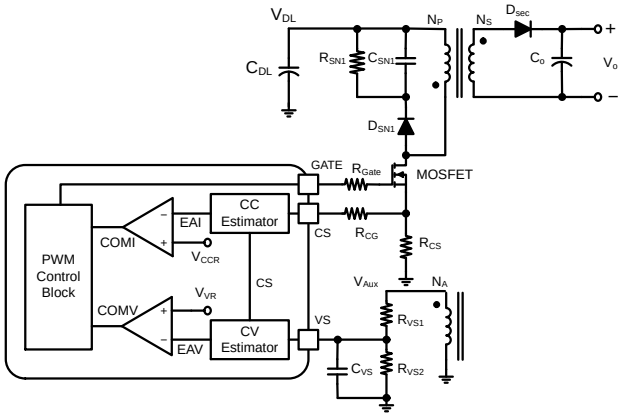


Figure 24. Simplified PSR Flyback Converter Circuit

Figure 25. Cycling CurrenA1nand VS Saplifg Cin DCMTETqe15.1 0 04ConverVS S Tm.19711wcm 0 0 m25..08 36.154 .624 2.D600o

Deep Green Mode (DPGN) Operation in CV Mode

FAN105A integrated MWSAVER technology that minimize current consumption and frequency at DPGN mode is fixed to minimum switching frequency ($f_{OSC\ DPGN}$) and variable Pulse width based on VS sampling voltage (EAV). V_{VS} regulated boundary are between $V_{VS\ EAV\ H}$ and $V_{VS\ EAV\ L}$.

After exit DPGN, internal regulation reference voltage was changed to V_{VR}.

FAN105A DPGN entry and exit criteria showed as below:

- DPGN entry need to meet both criteria as below:
  - Minimum frequency ($f_{OSC\ MIN}$) operation continues over than $N_{DPGN\ Entry}$ switching cycles.
  - EAV > $V_{VS\ EAV\ H}$ (2.550 V).
- DPGN exit criteria, meet one of below criteria:
  - EAV < $V_{VS\ EAV\ L}$ (2.525 V) and maximum on time at DPGN.
  - EAV < $V_{VS\ EAV\ DYN}$ (2.4 V).

During the DPGN mode controlling, FAN105A decreases the operating current down to 450 μA. Therefore, the standby power could meet international standard requirement when work with flexible start up circuit, designer have flexible start up circuit that HV FET or start up resistor depending on cost and better standby power consideration.

Cable Drop Compensation (CDC)

FAN105A integrates cable drop compensation function and the compensation weighting is calculated based on t_{DIS}, current sense voltage (V_{CS}), and CDC setting resistor (R_{CDC}) needed to between VDD and AUX pin. During startup, as VDD reached $V_{DD\ ON}$, CDC programming block detects AUX pin current and determine cable drop compensation weighting based on current weighting of AUX pin. Once finished CDC compensation weighting detecting, the information will stored until shunt down by protections or VDD lower than $V_{DD\ OFF}$. The CDC weighting automatic detected input current during start up. which provides a constant output voltage at the end of the cable over the entire load range in CV Mode. The table shows the compensation weighting with corresponding R_{CDC} setting as below:

Table 1. CDC WEIGHTING AND R_{CDC} SETTING

R_{CDC}	Label	V_{VS} Compensation Weighting
1.3 MΩ	$V_{VS-CDC1}$	0.08 V
920 kΩ	$V_{VS-CDC2}$	0.16 V

VS Over Voltage Protection (VSOVP)

The VSOVP is designed to prevent TA output voltage is over then the rating of used components, like capacitor. VSOVP has 4 switching cycles of denounce time and that prevent mis triggered of VSOVP by switching noise. The protection level is changed in proportional to the CDC weighting.

VSOVP trigger level can be illustrates as following formula:

$$V_{O-OVP} = \left(V_{VS-UVP} + V_{VS-CDC} \cdot \frac{I_O}{I_{O-CC}}\right) \cdot \left(1 + \frac{R_{VS1}}{R_{VS2}}\right) \cdot \frac{N_S}{N_A} \quad \text{(eq. 7)}$$

CS Pin Protection (CSP)

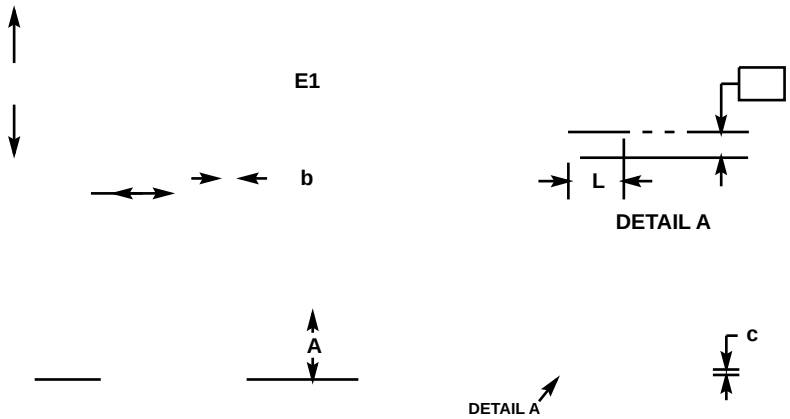
In order to prevent MOSFET current over than safe operating area, FAN105A build in cycle by cycle over current protection. The protection could protect MOSFET damaged by saturation current and CS pin sensing error. As CS PIN signal meet below conditions FAN105A will turn off Gate immediately. Current Sensing Protection (CSP) criteria shows as below:

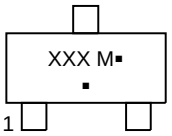
- V_{CS} < 0.2 V after switching turn on 4.5 μs at low line or 1.5us at high line.
- V_{CS} > 1.5 V

Over

SOT−23, 6 Lead
CASE 527AJ

SCALE 2:1





XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “