FAN7601

Green Current Mode PWM Controller

Features

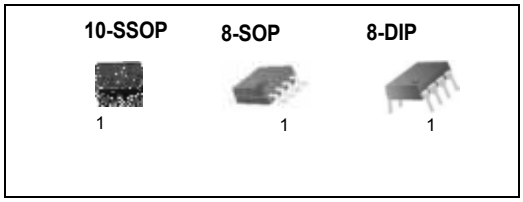
- Green Current Mode PWM Control
- Low Operating Current: Max 4mA
- Burst Mode Operation
- Internal High Voltage Start-up Switch
- Under Voltage Lockout (UVLO): 12V/8V
- Latch Protection & Soft Start Function
- Over Voltage Protection: 19V
- Operating Frequency up to 300kHz
- Max Duty Cycle: 95%

Typical Applications

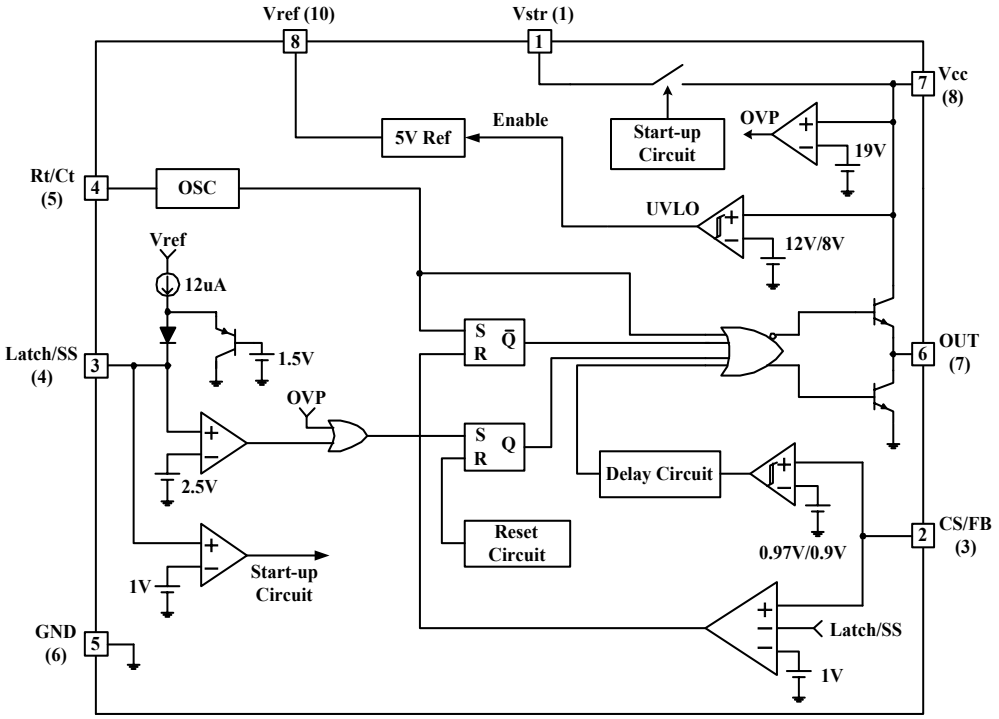
- Off-Line Adapter Applications
- Auxiliary Power Supplies

Description

The FAN7601 is a green programmable frequency current mode PWM controller. It is specially designed for the off-line adapter application and the auxiliary power supplies which require high efficiency at a light load and no load. The internal high voltage start-up switch and the burst mode reduce the power loss. The FAN7601 includes some protections such as latch protection and over voltage protection. The latch protection can be used for over voltage protection and/or thermal protection and so on. And the soft start prevents the output voltage over shoot at start up.



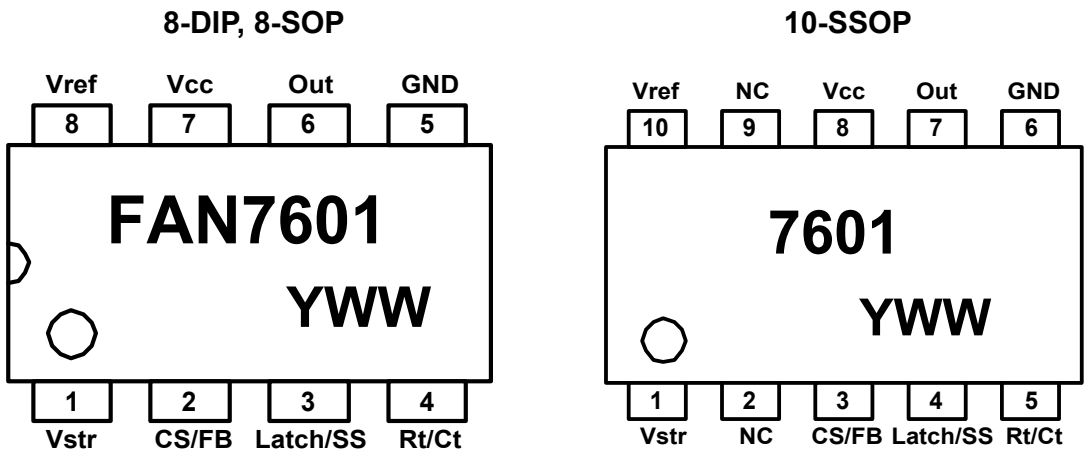
Internal Block Diagram



* ( ) is 10-SSOP PIN Number

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Pin Assignments



Pin Definitions

Pin Number	Pin Name	Pin Function Description
1 (1)	Vstr	Start-up
2 (3)	CS/FB	Current Sense and Feedback
3 (4)	Latch/SS	Latch Protection and Soft Start
4 (5)	Rt/Ct	Oscillator Timing
5 (6)	GND	Ground
6 (7)	Out	Gate Drive Output
7 (8)	V_{CC}	IC Power Supply
8 (10)	V_{ref}	Voltage Reference

*( ) is 10-SSOP PIN Number

Absolute Maximum Ratings

(Ta = 25°C, unless otherwise specified)

Characteristics		Symbol	Value	Unit
Supply Voltage		V_{CC}	20	V
Input Voltage CS/FB		$V_{CS/FB}$	-0.3 to 20	V
Operating Temperature		T_{OPR}	-25 to +125	°C
Storage Temperature		T_{STG}	-55 to +150	°C
Junction Temperature		Tj	150	°C
Output Current		I_O	250	mA
Vstr Input Voltage		Vstr	500	V
ESD Capability, HBM Model (All pins except Vcc and Vstr)		-	2.0	kV
ESD Capability, Machine Model		-	300	V
Thermal Resistance, Junction to Air	8-DIP	Rθja	100	°C/W
	8-SOP		180	
	10-SSOP		130	

Electrical Characteristics

(T_a = -25°C ~ 125°C, Vcc = 14V, Rt = 9.5kΩ, Ct = 2.2nF unless otherwise specified)

Characteristics	Symbol	Conditions	Min.	Typ.	Max.	Unit
REFERENCE SECTION						
Reference Output Voltage	V_{ref}	I_O = 1mA	4.85	5.00	5.15	V
Line Regulation	ΔV_{ref1}	V_{CC} = 10V ~ 18V	-	10	20	mV
Load Regulation	ΔV_{ref2}	I_O = 1mA ~ 10mA	-	20	30	mV
OSCILLATOR SECTION						
Initial Accuracy	F_{OSC}	-	90	100	110	kHz
Voltage Stability	ST_V	V_{CC} = 10V ~ 18V	-	1.0	1.5	%
Amplitude	V_{OCS}	V_{pin4} peak-to-peak	-	1.25	-	V
PWM SECTION						
CS/FB Threshold Voltage1	$V_{CS/FB1}$	-	0.9	1.0	1.1	V
Maximum Duty Cycle	D_{MAX}	Ta = 25°C	92	95	98	%
Minimum Duty Cycle	D_{MIN}	-	-	-	0	%
BURST MODE SECTION						
CS/FB Threshold Voltage2(1)	$V_{CS/FB2}$	-	0.77	0.97	1.17	V
CS/FB Threshold Voltage3(1)	$V_{CS/FB3}$	-	0.7	0.9	1.1	V
SOFT START SECTION						
Soft Start Current	I_{SS}	V_{pin3} = GND	9	12	15	μA
Soft Start Limit Voltage(2)	V_{SL}	I_{SS} = 1μA	1.2	1.5	1.8	V
PROTECTION SECTION						
Latch Voltage	V_{LATCH}	-	2.25	2.5	2.75	V
Over Voltage Protection	V_{OVP}	-	18	19	20	V
UVLO SECTION						
Start Threshold Voltage	V_{tH}	-	11	12	13	V
Minimum Operating Voltage	V_{tL}	-	7	8	9	V
TOTAL CURRENT SECTION						
Operating Supply Current	I_{OP}	-	-	3	4	mA
OUTPUT SECTION						
Low Output Voltage	V_{OL}	Ta =25°C, I_O = 100mA	-	2	2.5	V
High Output Voltage	V_{OH}	Ta =25°C, I_O = -100mA	11.5	12	14	V
Rising Time (1)	T_r	Ta =25°C, Cl = 1nF	-	45	150	ns
Falling Time (1)	T_f	Ta =25°C, Cl = 1nF	-	35	150	ns
START UP SECTION						
VSTR Start-up Current	I_{str}	V_{str} = 30V, Ta =25°C	0.5	1	1.5	mA

Note:

1. These parameters, although guaranteed, are not 100% tested in production.
2. It is recommended to connect 1MΩ resistor between the Latch/SS pin and GND to prevent abnormal operation of the latch protection by noise coupling.

Typical Performance Characteristics

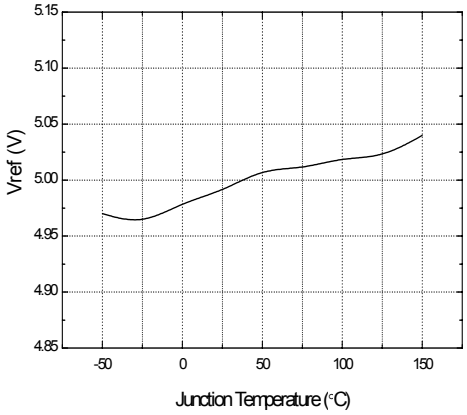


Figure 1. Trimmed Reference Voltage

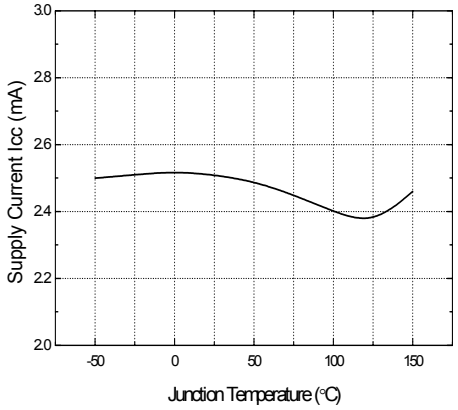


Figure 2. Supply Current

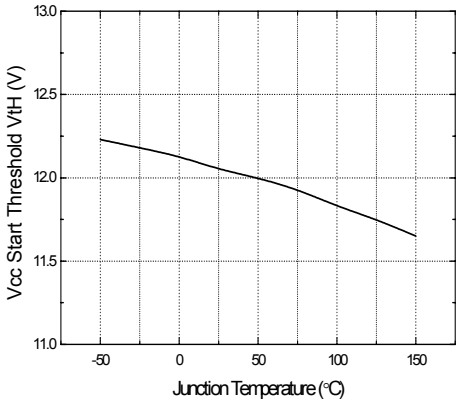


Figure 3. Vcc Start Threshold Voltage

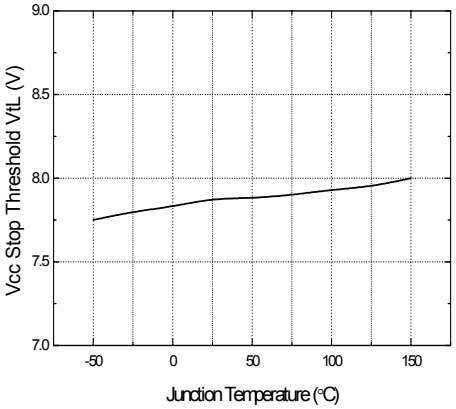


Figure 4. Vcc Stop Threshold Voltage

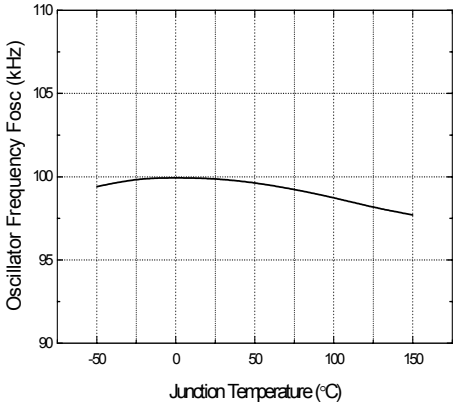


Figure 5. Oscillator Frequency

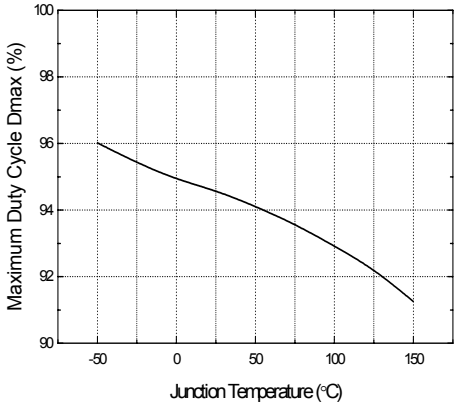


Figure 6. Maximum Duty Cycle

Typical Performance Characteristics (Continued)

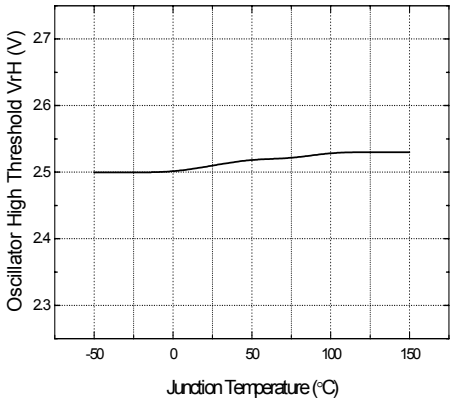


Figure 7. Oscillator High Threshold Voltage

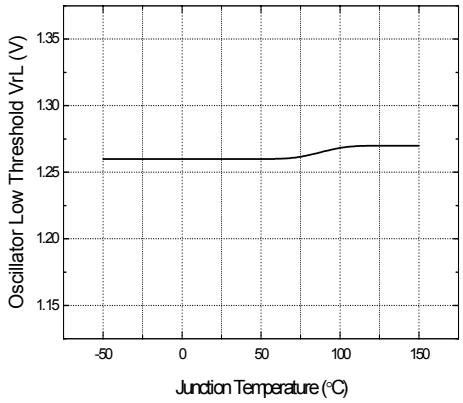


Figure 8. Oscillator Low Threshold Voltage

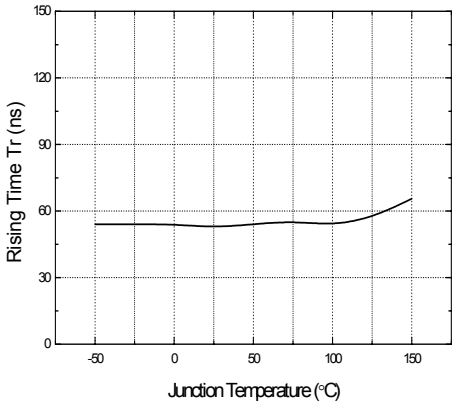


Figure 9. Output Rising Time

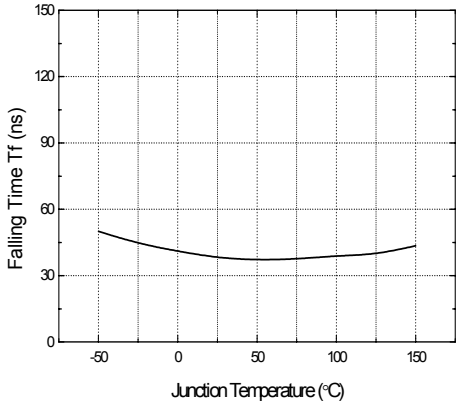


Figure 10. Output Falling Time

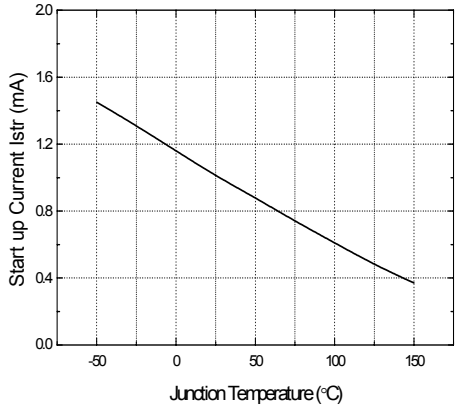


Figure 11. Start-up Current

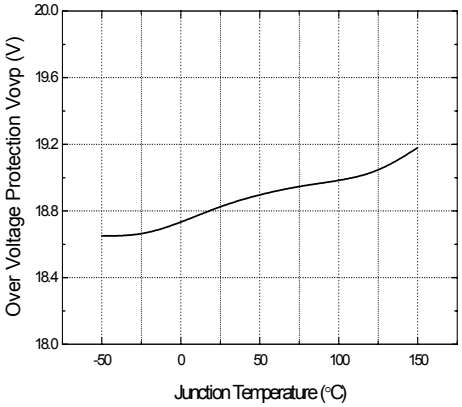


Figure 12. Over Voltage Protection Level

Typical Performance Characteristics (Continued)

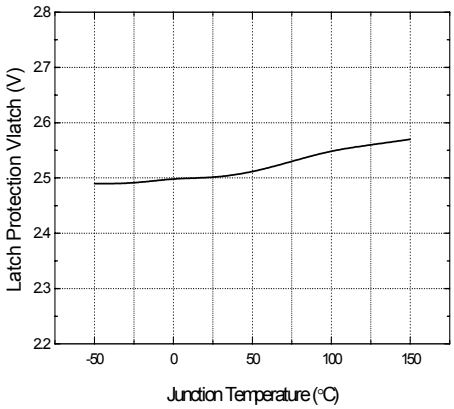


Figure 13. Latch Protection Voltage

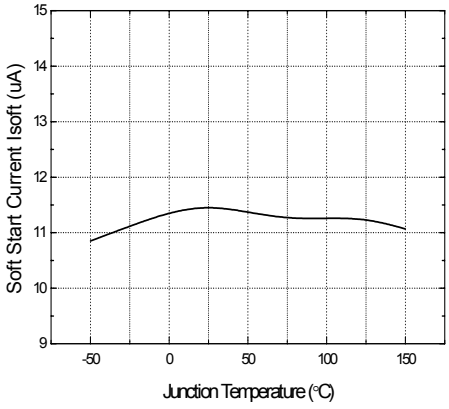


Figure 14. Soft Start Current

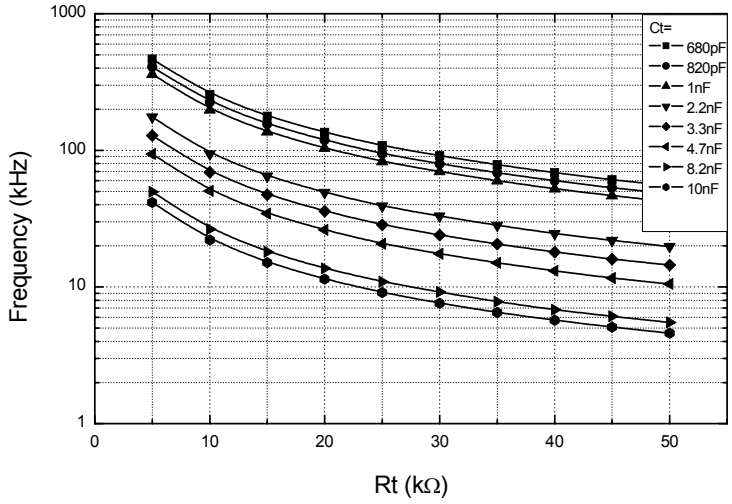
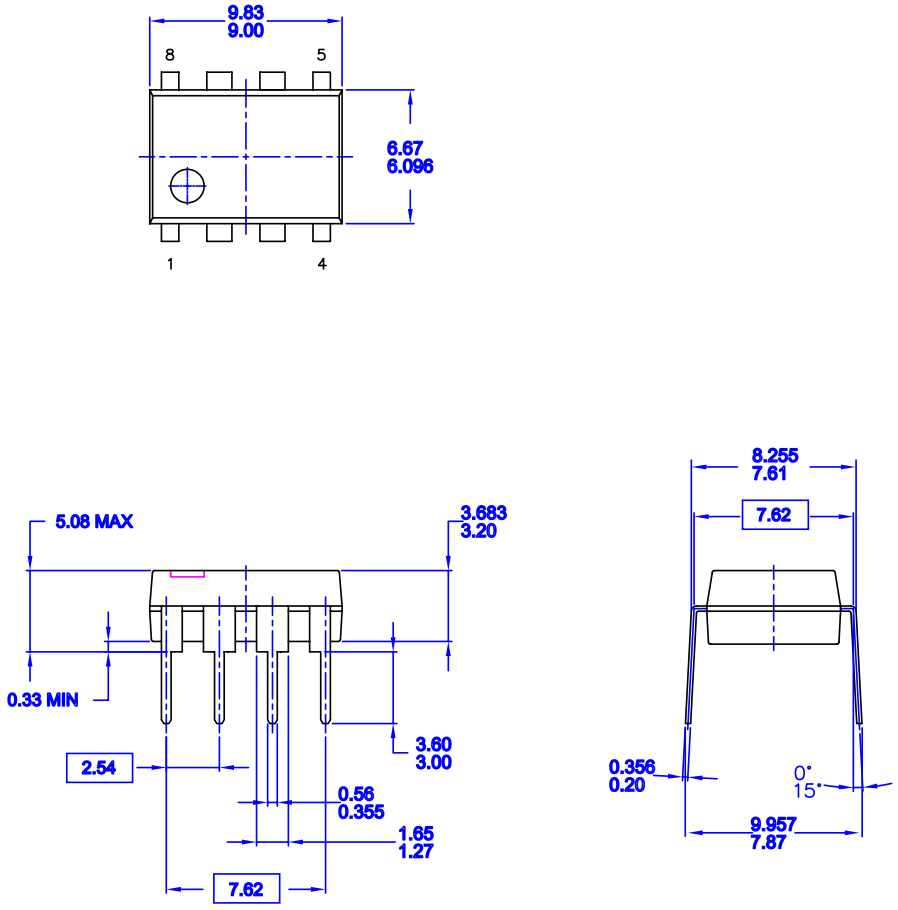


Figure 15. Oscillator Frequency Characteristic

Mechanical Dimensions

8DIP



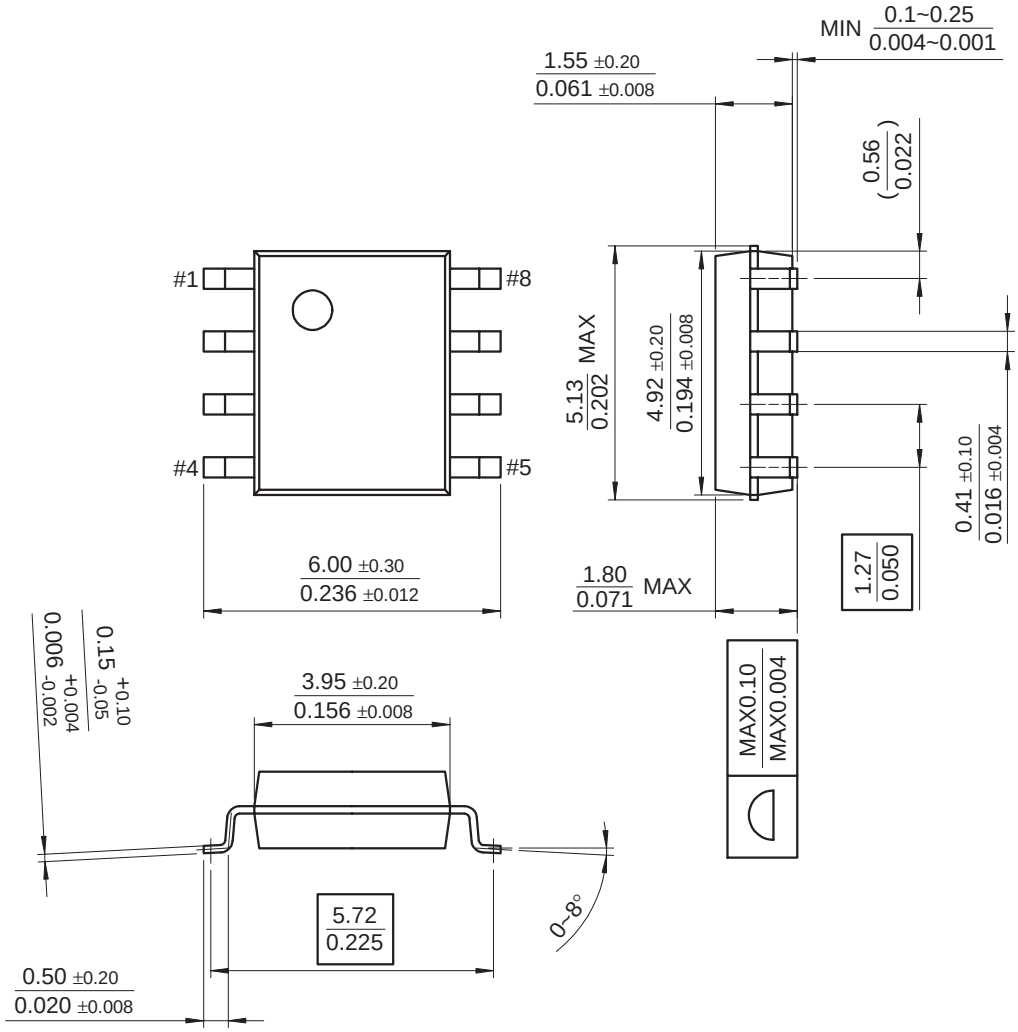
NOTES: UNLESS OTHERWISE SPECIFIED
A) THIS PACKAGE CONFORMS TO JEDEC MS-001 VARIATION BA
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
D) DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994

MKT-N08FrevB

Mechanical Dimensions (Unit: mm) (Continued)

Package

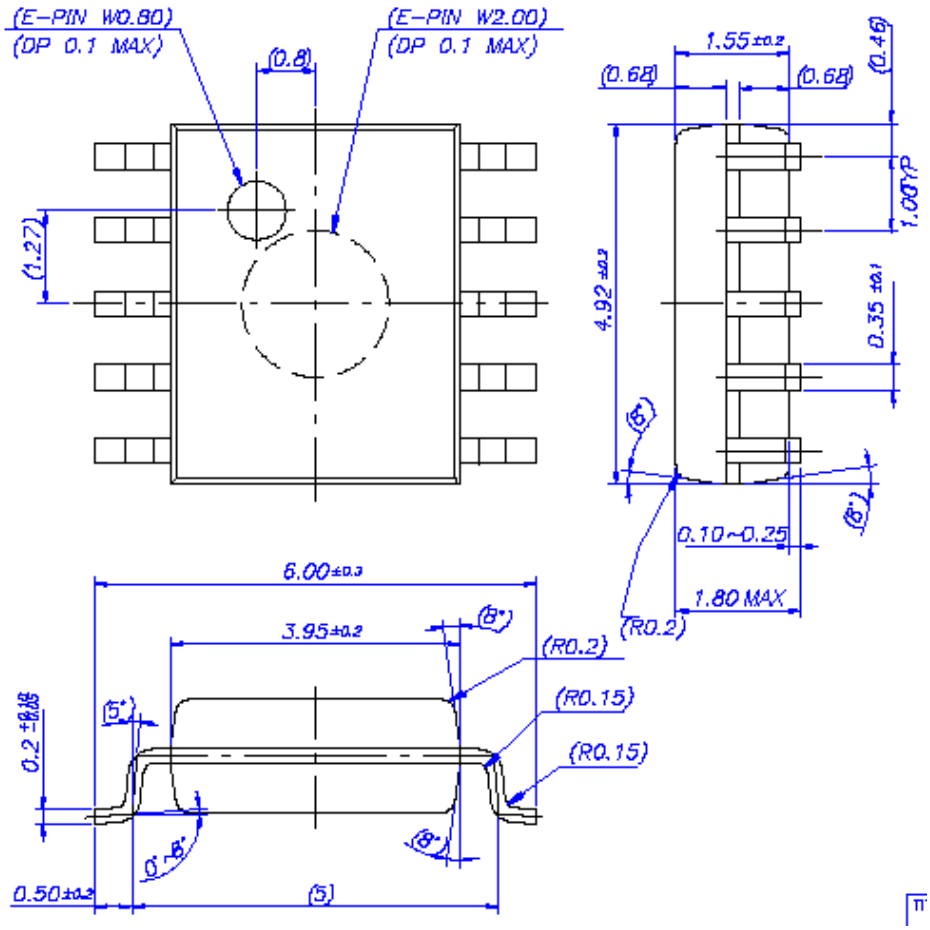
8-SOP



Mechanical Dimensions (Unit: mm) (Continued)

Package

10-SSOP-225



Ordering Information

Device	Package	Operating Temp.
FAN7601N	8-DIP	-25°C ~ 125°C
FAN7601M	8-SOP	
FAN7601G	10-SSOP	

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