ShinDengen

MS1007SH

Quasi-Resonant Power Supply IC

Feature

- Quasi-resonant mode
- Four-step soft-start function
- HV startup circuit
- The automatic bottom-skip function (1time)
- Auto-burst mode
- Soft drive circuit reduces noise
- Vcc-GND short circuit protection function
- Overload protection (auto reset)
- Overvoltage protection (auto reset)
- Thermal shutdown (auto reset)
- Pb free
- RoHS:Yes

Outline

House Name: SOP8/7J

1 Absolute Maximum Ratings (at Tc=25℃)
1 絶対最大定格 (at Tc=25℃)

1-1 Thermal Ratings
1-1 熱規格

Item 項目	Symbol 記 号	Ratings 規 格 値	Unit 単位
Storage temperature 保存温度	Tstg	−55～150	℃
Junction temperature 接合部温度	Tj	−40～150	℃
Total power dissipation 許容損失	Pt	1.5	W

1-2 Electrical Ratings
1-2 電気的規格

Item 項目	Symbol 記 号	Ratings 規 格 値	Unit 単位
Vin maximum applied voltage Vin端子最大印加電圧	Vin	500	V
Vin reverse bias voltage Vin端子逆バイアス電圧	−	−0.3	V
VCC maximum applied voltage VCC端子最大印加電圧	VCC	30	V
VCC reverse bias voltage VCC端子逆バイアス電圧	−	−0.3	V
Z/C into maximum current Z/C端子最大流入電流	IZ/C	±5	mA
F/B into maximum current F/B端子最大流入電流	IF/B	±5	mA
OCL into maximum current OCL端子最大流入電流	IOCL	±5	mA

Notes : Using with parameters, condition of use and logic controls that are not specified in the specifications are not assured.
When used with the conditions that are not specified, please consult us in advance.
The contents described herein are subject to change without notice.

注意 : 本仕様書に記載されていない項目、使用条件、論理の組み合わせでの使用は保証していません。
記載されている以外の条件で使用する場合は必ず事前に当社担当営業部門までご相談下さい。
記載内容は改良などのためにお断り無しに変更することがあります。

2 Recommended Operation Conditions
2 推奨動作条件

Item 項目	Symbol 記 号	Recommended value 推 奨 値			Unit 単位
		min	typ	max	
Operating temperature 動作温度	Top	−40	−	125	℃
Vin applied voltage Vin端子印加電圧	Vin	95	−	450	V
VCC applied voltage VCC端子印加電圧	VCC	11	−	21	V
Z/C into current Z/C端子入力電流	IZ/C	−4.5	−	4.5	mA

Notes : The product life depends on the condition of use even within the above operating conditions.
Using at Tj = 100℃ or less is recommended for the equipment where a long life is expected.

注意 : 上記の規格範囲内においても、製品寿命に関しましてはお客様の使用環境により異なりますので、長寿命を期待される製品に、ご使用される場合には Tj=100℃以下でご使用頂く事を推奨致します。

3-1 Electrical/Thermal Characteristics (at Ta=25℃)
3-1 電気的・熱的特性 (at Ta=25℃)

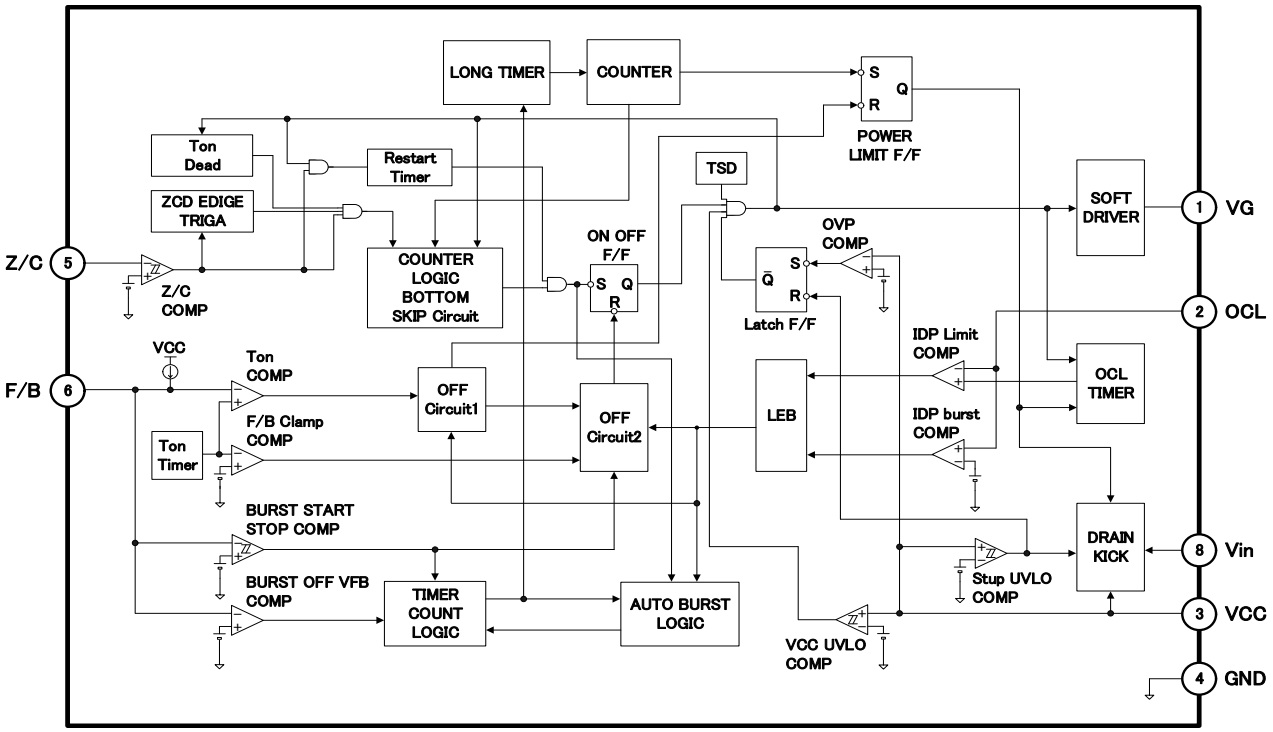
Item 項 目	Symbol 記 号	Condition 条 件	Ratings 規 格 値			Unit 単位
			min	typ	max	
VCC端子 (VCC Terminal)						
On-state voltage 発振開始電圧	VCC(start)	VOCL=0V VF/B=2.5V	–	12.0	13.5	V
Under-voltage lockout (UVLO) 発振停止電圧	VCC(stop stby)	VOCL=0V VF/B=2.5V	6.2	7.0	7.8	V
	VCC(stop normal)	VOCL=0.4V VF/B=2.5V	7.2	8.0	8.8	V
Start-up circuit cut-off voltage 起動回路OFF電圧	VCC(stup off)	VOCL=0V VF/B=12kΩ Vin=100V	10.5	12.0	13.5	V
Start-up circuit on voltage 起動回路ON電圧	VCC(stup on stby)	VOCL=0V VF/B=12kΩ Vin=100V	7.0	8.0	9.0	V
	VCC(stup on normal)	VOCL=0.4V VF/B=12kΩ Vin=100V	8.0	9.0	10.0	V
Over-voltage threshold 過電圧発振停止電圧	VOVP(STOP)	VOCL=0V VF/B=2.5V	21.5	23.0	24.0	V
Over-voltage reset threshold 過電圧発振停止解除電圧	VOVP(RESET)	VOCL=0V VF/B=2.5V	7.0	8.0	–	V
VCC current (Active mode) VCC電流(動作時)	ICC(active)	VCC=14V VOCL=0.1V VF/B=2.5V fZ/C=50kHz	–	2.5	4.0	mA
VCC current (Auto standby mode) VCC電流(自動ｽﾀﾝﾊﾞｲﾓｰﾄﾞ発振停止時)	ICC(auto stby)	VCC=14V VOCL=0.1V VF/B=0V	–	1.3	2.2	mA
VCC current (Start-up mode) VCC電流(起動ﾓｰﾄﾞ時)	ICC(stup)1	Vin=100V VCC=0 to 1.5V	-3.5	-2.0	-0.5	mA
	ICC(stup)2	Vin=100V VCC=3V to VCC(stup off)-0.8V	-17.0	-10.0	-3.0	mA
Z/C端子 (Z/C Terminal)						
Zero current detection voltage ｾﾞﾛ検出電圧	VZ/C	VCC=14V VOCL=0.1V VF/B=2.5V	0.15	0.25	0.35	V
Clamping voltage (High) ｸﾗﾝﾌﾟ電圧(High)	VCL(H)	IZ/C=1mA	–	6.2	–	V
Clamping voltage (Low) ｸﾗﾝﾌﾟ電圧 (Low)	VCL(L)	IZ/C=-1mA	–	-0.7	–	V
F/B端子 (F/B Terminal)						
F/B output current F/B定電流源	IF/B	VOCL=0.1V VCC=14V VF/B=0V	-230	-200	-165	μA
F/B minimum on time F/Bｵﾝ幅min	TonF/B(min)	VCC=14V VOCL=0.1V fZ/C=20kHz	–	0.7	3.0	μs
F/B maximum on time F/Bｵﾝ幅max	TonF/B(max)	VCC=14V VOCL=0.1V fZ/C=20kHz	22	31	39	μs
電流検出 (Current Detection)						
Over current limit correction start voltage 垂下入力補正ｽﾀｰﾄ電圧	VTH(OCL start)	VCC=14V VF/B=3.5V fZ/C=20kHz	0.30	0.38	0.44	V
Over current limit correction clamp voltage 垂下入力補正ｸﾗﾝﾌﾟ電圧	VTH(OCL)clamp	VCC=14V VF/B=3.5V fZ/C=20kHz	0.47	0.54	0.59	V
Over current limit correction time width 垂下入力補正幅	TOCL	VCC=14V VF/B=3.5V fZ/C=20kHz VOCL=VTH(OCL start) ⇒ VTH(OCL)clamp	–	7.3	–	μs
Leading edge blanking time ﾘｰﾃﾞｨﾝｸﾞｴｯｼﾞﾌﾞﾗﾝｸﾀｲﾑ (※1)	TLEB	VCC=14V VF/B=2.5V VOCL=0.4V	–	300	–	ns
自動ｽﾀﾝﾊﾞｲ (Auto standby mode)						
Standby switch time ｽﾀﾝﾊﾞｲ切替時間	Tstby	VCC=14V VF/B=2.5V VOCL=0V fZ/C=25kHz	180	250	310	ms
Standby on-state F/B voltage ｽﾀﾝﾊﾞｲ発振開始F/B電圧	VF/B(stby start)	VCC=14V VOCL=0V fZ/C=25kHz	1.6	1.8	2.0	V
Standby UVLO (F/B) ｽﾀﾝﾊﾞｲ発振停止F/B電圧	VF/B(stby stop)	VCC=14V VOCL=0V fZ/C=25kHz	0.6	0.8	1.0	V
Standby reset F/B voltage ｽﾀﾝﾊﾞｲ解除F/B電圧	VF/B(stby reset)	VCC=14V VOCL=0V fZ/C=25kHz	2.7	3	3.3	V
Standby switch voltage ｽﾀﾝﾊﾞｲ切替電圧	VOCL(stby)	VCC=14V VF/B=2.5V fZ/C=25kHz	–	40	–	mV
Standby threshold voltage ｽﾀﾝﾊﾞｲ電流しきい値電圧	VTH(stby)	VCC=14V VF/B=2.5V fZ/C=25kHz	35	60	75	mV

3-2 Electrical/Thermal Characteristics (at Ta=25℃)
3-2 電気的・熱的特性 (at Ta=25℃)

Item 項 目	Symbol 記 号	Condition 条 件	Ratings 規 格 値			Unit 単位
			min	typ	max	
自動谷飛び (Bottom skip)						
Bottom skip start time 谷飛び開始周期	T(bottom skip start)	VCC=14V VF/B=1.5V VOCL=0.1V	6.7	7.5	8.5	μs
Bottom skip stop time 谷飛び停止周期	T(bottom skip stop)	VCC=14V VF/B=1.5V VOCL=0.1V	10.5	13.0	15.0	μs
Bottom skip time hysteresis 谷飛び周期ﾋｽﾃﾘｼｽ	T(bottom skip hys)	VCC=14V VF/B=1.5V VOCL=0.1V	−	5.5	−	μs
Bottom skip count 谷飛び回数	C(bottom skip)	VCC=14V VF/B=1.5V VOCL=0.1V	−	1	−	count
ﾌﾟﾛﾃｸﾄﾓｰﾄﾞ (Protect mode)						
Protect mode count ﾌﾟﾛﾃｸﾄﾓｰﾄﾞｶｳﾝﾄ	T(Protect mode count)	VCC=14V VF/B=5V VOCL=0.2V fZ/C=20kHz	180	250	310	ms
Protect mode count start voltage ﾌﾟﾛﾃｸﾄﾓｰﾄﾞｶｳﾝﾄ開始電圧	VF/B(Protect mode count)	VCC=14V VOCL=0.2V fZ/C=20kHz	4.2	4.6	−	V
Protect mode threshold voltage ﾌﾟﾛﾃｸﾄﾓｰﾄﾞ電流しきい値電圧	VTH(Protect mode)	VCC=14V VF/B=5V fZ/C=20kHz	80	120	160	mV
ｿﾌﾄﾄﾞﾗｲﾌﾞ (Soft drive)						
Clamp voltage ｸﾗﾝﾌﾟ電圧	VG(clamp)	VCC=14V VF/B=2.5V VOCL=0V	10.7	12.0	13.2	V
Trigger voltage ﾄﾘｶﾞｰ電圧	VG(trigger)	VCC=14V VF/B=2.5V VOCL=0V	6.3	7.0	7.7	V
Trigger current ﾄﾘｶﾞｰ電流	IG(trigger)	VCC=14V VF/B=2.5V VOCL=0V VG=4V	−60	−50	−40	mA
Source current ｿｰｽ電流	IG(source)	VCC=14V VF/B=2.5V VOCL=0V VG=10V	−4.5	−3.6	−2.5	mA
Sink current ｼﾝｸ電流	IG(sink)	VCC=14V VF/B=0V VOCL=0V VG=5V	460	570	680	mA
ｿﾌﾄｽﾀｰﾄ (Soft start mode)						
SS threshold voltage1 ｿﾌﾄｽﾀｰﾄしきい値電圧1	Vss1	VCC=14V VF/B=2.5V fZ/C=25kHz t=Tss1 , Tss(stby return)1	20	40	65	mV
SS threshold voltage2 ｿﾌﾄｽﾀｰﾄしきい値電圧2	Vss2	VCC=14V VF/B=2.5V fZ/C=25kHz t=Tss2 , Tss(stby return)2	90	120	180	mV
SS threshold voltage3 ｿﾌﾄｽﾀｰﾄしきい値電圧3	Vss3	VCC=14V VF/B=2.5V fZ/C=25kHz t=Tss3 , Tss(stby return)3	280	350	420	mV
SS time ｿﾌﾄｽﾀｰﾄ時間	Tss1	VCC=14V VF/B=2.5V fZ/C=25kHz VOCL=Vss1	−	45	−	ms
	Tss2	VCC=14V VF/B=2.5V fZ/C=25kHz VOCL=Vss2	−	35	−	ms
	Tss3	VCC=14V VF/B=2.5V fZ/C=25kHz VOCL=Vss3	−	35	−	ms
SS time when standby returns ｽﾀﾝﾊﾞｲ復帰時ｿﾌﾄｽﾀｰﾄ時間	Tss(stby return)1	VCC=14V VF/B=3.5V fZ/C=25kHz VOCL=Vss1	−	0.7	−	ms
	Tss(stby return)2	VCC=14V VF/B=3.5V fZ/C=25kHz VOCL=Vss2	−	0.5	−	ms
	Tss(stby return)3	VCC=14V VF/B=3.5V fZ/C=25kHz VOCL=Vss3	−	0.5	−	ms
その他 (Others)						
Restart time ﾘｽﾀｰﾄﾀｲﾏ	Trestart	VCC=14V VF/B=2.5V VOCL=0.1V	20	40	60	μs
	Trestart(OCL)	VCC=14V VF/B=2.5V VOCL=0.4V	120	235	370	μs
On dead time ｵﾝﾄﾘｶﾞﾃﾞｯﾄﾞﾀｲﾑ	Tondead	VCC=14V VF/B=2.5V VOCL=0.4V	−	2	−	μs
Over temperature sense (Stop) 過熱保護発振停止温度 (※1)	OTS(H)	VCC=14V VF/B=2.5V	−	150	−	℃
Over temperature sense (Reset) 過熱保護発振復帰温度 (※1)	OTS(L)	VCC=14V VF/B=2.5V	−	110	−	℃
Thermal resistance 熱抵抗	Rth(j-c)	ガラエポ基板 :114.3mm×76.2mm, 厚さ:1.6mm 内面銅箔サイズ :74.2mm×74.2mm, 厚さ:35μm	−	−	13	℃/W
	Rth(j-a)	Glass-Epoxy Board :114.3mm×76.2mm, Thickness:1.6mm inside copper foil :74.2mm×74.2mm, Thickness:35μm	−	−	83.3	℃/W

(※1) 設計保証
(※1)Design assurance

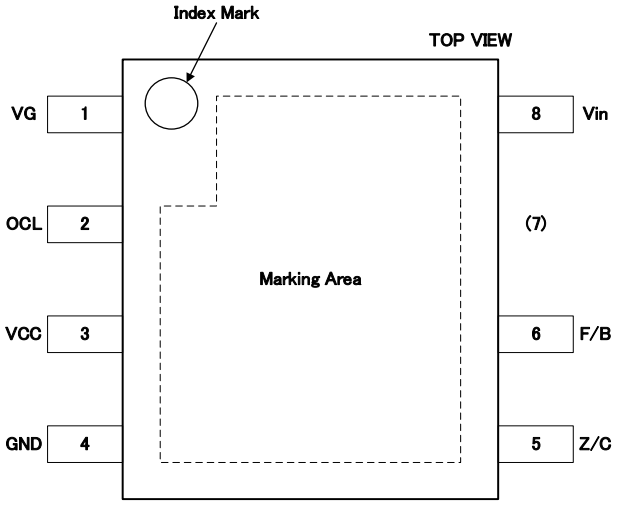
4 Block Diagram
4 ブロック図



5 Pin Function
5 端子機能

Terminal No. 端子番号	Symbol 記号	Terminal Name 端子名称
1	VG	VG Terminal VG端子
2	OCL	Over Current Limit Terminal オーバーカレントリミット端子
3	VCC	VCC Terminal VCC端子
4	GND	Ground Terminal グランド端子
5	Z/C	Zero Current Detection Terminal ゼロ電流検出端子
6	F/B	Feed Back Terminal フィードバック端子
8	Vin	Vin Terminal Vin端子

6 Pin Assignment
6 端子配置

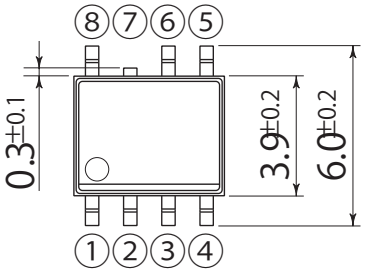


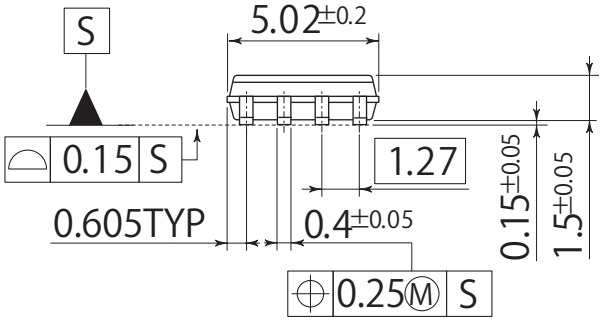
Package Outline-Dimensions

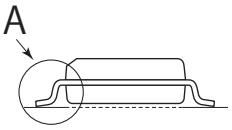
unit : mm
scale: 4/1

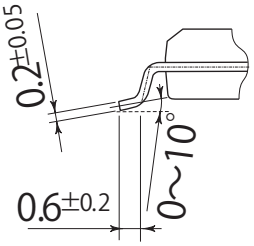
L3

JEDEC Code	–
JEITA Code	–
House Name	SOP8/7J

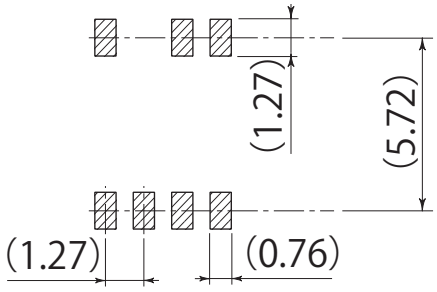








Detail A



Referential Soldering Pad

・量産時には、適正化を図って下さい
・Optimize soldering pad to the board design and soldering condition.

・本資料の記載内容は、改良のため予告なく変更することがあります
・ご使用にあたりましては、別途仕様書を必ずご請求下さい
・The content specified herein is subject to change for improvement without notice.
・If you wish to use any such products, please be sure to refer to the specifications.

ShinDengen

Notes

1. If you wish to use any such product, please be sure to refer to the specifications issued by Shindengen.
2. All products described or contained herein are designed with a quality level intended for use in standard applications requiring an ordinary level of reliability. If these products are to be used in equipment or devices for special or specific applications requiring an extremely high grade of quality or reliability in which failures or malfunctions of products may directly affect human life or health, a local Shindengen office must be contacted in advance to confirm that the intended use of the product is appropriate. Shindengen products are grouped into the following three applications according the quality grade.

   【Standard applications】
   Computers, office automation and other office equipment, communication terminals, test and measurement equipment, audio/visual equipment, amusement equipment, consumer electronics, machine tools, personal electronic equipment, industrial equipment, etc.
   【Special applications】
   Transportation equipment (vehicles, ships, etc.), trunk-line communication equipment, traffic signal control systems, anti-disaster/crime systems, safety equipment, medical equipment, etc.
   【Specific applications】
   Nuclear reactor control systems, aircraft, aerospace equipment, submarine repeaters, life support equipment and systems, etc.
3. Although Shindengen continuously endeavors to enhance the quality and reliability of its products, customers are advised to consider and take safety measures in their design, such as redundancy, fire containment and anti-failure, so that personal injury, fires, or societal damages can be prevented.
4. Please note that all information described or contained herein is subject to change without notice due to product upgrades and other reasons. When buying Shindengen products, please contact the Company's offices or distributors to obtain the latest information.
5. Shindengen shall not bear any responsibility with regards to damages or infringement of any third-party patent rights and other intellectual property rights incurred due to the use of information on this website.
6. The information and materials on this website neither warrant the use of Shindengen's or any third party's patent rights and other intellectual property rights, nor grant license to such rights.
7. In the event that any product described or contained herein falls under the category of strategic products controlled under the Foreign Exchange and Foreign Trade Control Law of Japan, exporting of such products shall require an export license from the Japanese government in accordance with the above law.
8. No reprinting or reproduction of the materials on this website, either in whole or in part, is permitted without proper authorization from Shindengen.