

MH2503SC

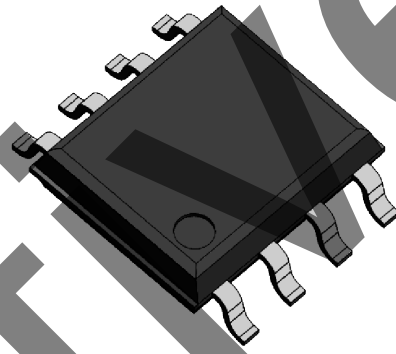
PFC ICs

Feature

- Leader IC
- Critical Current Mode
- Enabled multiphase interleaving of 3 or more phases with follower IC
- No winding for ZC detection
- VCC withstand voltage 26 V
- AC input voltage monitoring
- Overcurrent protection
- Overvoltage protection
- FB Open/Short Protection
- Short Circuit Protection of Output Diode
- Pb free terminals
- RoHS:Yes

Outline

House Name : SOP8J



1 Absolute Maximum Ratings (at Tc=25°C)

1 絶対最大定格 (at Tc=25°C)

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	°C
Junction temperature 接合部温度	Tj	-40 ~ 150	°C
Total power dissipation 許容損失	Pt	1.5	W
Thermal resistance 熱抵抗 (※1)	Rth(j-c)	13	°C/W
	Rth(j-a)	83.3	°C/W

(※1) 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: 35 μm
Glass-Epoxy Board : 114.3mm × 76.2mm, Thickness: 1.6mm Inside copper foil : 74.2mm × 74.2mm, Thickness: 35 μm

1-2 Electrical Ratings

1-2 電氣的規格

Item 項目	Symbol 記号	Ratings 規格値	Unit 単位
VCC maximum applied voltage VCC端子 最大印加電圧	VCC	-0.3 ~ 26	V
F/B into maximum current F/B端子最大流入電流	IFB	-5 ~ 5	mA
COMP into maximum current COMP端子最大流入電流	ICOMP	-5 ~ 5	mA
IL_OUT into maximum current IL_OUT端子最大流入電流	IIL_OUT	-5 ~ 5	mA
VDZC into maximum current VDZC端子最大流入電流	IVDZC	-5 ~ 5	mA
OCL into maximum current OCL端子最大流入電流	IOCL	-5 ~ 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。

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	°C
VCC applied voltage VCC端子印加電圧	VCC	12	-	23	V
VDZC into current VDZC端子入力電流	IVDZC	-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°C 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°C以下でご使用頂く事を推奨致します。

3-1 Electrical/Thermal Characteristics (at Ta=25°C)

3-1 電氣的・熱的特性 (at Ta=25°C)

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)	FB=1V COMP=3V OCL=0V	10.5	11.0	11.5	V
Under-voltage lockout (UVLO) 発振停止電圧	VCC(stop)	FB=1V COMP=3V OCL=0V	7.5	8.0	8.5	V
VCC start/stop hysteresis voltage 発振開始-停止ヒステリシス	VCC(hys)	FB=1V COMP=3V OCL=0V	2.5	3.0	3.5	V
VCC current (Active mode) VCC電流(動作時)	ICC(act)	VCC=15V FB=1V FVDZC=30kHz OCL=0V COMP=4.5V	1.0	2.0	3.0	mA
VCC current (UVLO mode) VCC電流(発振停止時)	ICC(UVLO)	VCC=7V	-	-	100	μA
VCC current (standby mode) VCC電流(スタンバイモード時)	ICC(stby)	VCC=15V FB=0V OCL=0V COMP=4.5V	-	-	100	μA
Latch reset voltage ラッチ解除電圧	VUL	FB=1V COMP=3V OCL=0V	6.5	7.0	7.5	V
Latch reset voltage hysteresis ラッチ解除電圧ヒステリシス	VCC(stop)-VUL		0.2	1.0	1.5	V
OUT端子 (OUT Terminal)						
Source current ソース電流	Iout(source)	VCC=12V OUT=6.5V	-0.8	-0.5	-0.2	A
Sink current シンク電流	Iout(sink)	VCC=12V OUT=4.0V	0.8	1.2	1.5	A
IL_OUT端子 (IL_OUT Terminal)						
IL_OUT output voltage(H1) IL_OUT出力電圧(H1)	VIL(H1)	COMP ≥ 1.55/1.45V	4.8	5.1	5.4	V
IL_OUT output voltage(H2) IL_OUT出力電圧(H2)	VIL(H2)	COMP < 1.55/1.45V	2.4	2.7	3.0	V
IL_OUT output voltage(L) IL_OUT出力電圧(L)	VIL(L)		0	-	0.5	V
IL_OUT output voltage hysteresis IL_OUT出力ヒステリシス	VIL(hys)	VIL(H1)-VIL(H2)	2.0	2.4	2.8	V
Source current(H1) ソース電流(H1)	IL(source)H1	COMP ≥ 1.55/1.45V IL_OUT=0V	-6.5	-4.5	-2.0	mA
Source current(H2) ソース電流(H2)	IL(source)H2	COMP < 1.55/1.45V IL_OUT=0V	-3.4	-2.4	-1.1	mA
Sink current(H1) シンク電流(H1)	IL(Sink)H1	COMP ≥ 1.55/1.45V IL_OUT=5V	12	22	32	mA
Sink current(H2) シンク電流(H2)	IL(Sink)H2	COMP < 1.55/1.45V IL_OUT=3V	6.4	11.6	16.9	mA
IL_OUT on time(FB_OVP mode) FB_OVP時IL_OUTオン出力時間	FB_OVP_TIMER	OCL=0V FB=1V→4V	60	80	100	μs
F/B端子 (F/B Terminal)						
Error amplifier threshold voltage エラーアンプしきい値	FB_ref	COMP=1V	2.977	3.000	3.023	V
Overvoltage protection voltage 過電圧保護電圧	FB_OVP		FB_ref(MIN) *1.08	FB_ref(TYP) *1.08	FB_ref(MAX) *1.08	V
Standby mode threshold voltage スタンバイモードしきい値	FB_stby	COMP=1V	3.7	3.8	3.9	V
Open protection voltage オープン保護電圧	FB_open	OCL=0V	0.3	0.4	0.5	V

3-2 Electrical/Thermal Characteristics (at Ta=25°C)

3-2 電氣的・熱的特性 (at Ta=25°C)

Item 項目	Symbol 記号	Condition 条件	Ratings 規格値			Unit 単位
			min	typ	max	
VDZC端子 (VDZC Terminal)						
検出モード切替しきい値_セット	VZC_set		T.B.D	-0.15	T.B.D	V
検出モード切替しきい値_リセット	VZC_reset		T.B.D	0.1	T.B.D	V
ゼロ電流検出電圧_巻き線レスHi	VZC_Hi(L)		FB-0.1985	FB-0.2000	FB-0.2015	V
	VZC_Hi(H)		FB-0.1191	FB-0.1200	FB-0.1209	V
ゼロ電流検出電圧_巻き線レスHi ヒステリシス幅	VZC_Hi(H)-VZC_Hi(L)		T.B.D	0.08	T.B.D	V
ゼロ電流検出電圧_巻き線レスLo	VZC_Lo(L)		0.0992	0.1000	0.1008	V
	VZC_Lo(H)		0.1488	0.1500	0.1512	V
ゼロ電流検出電圧_巻き線レスLo ヒステリシス幅	VZC_Lo(H)-VZC_Lo(L)		T.B.D	0.05	T.B.D	V
Overvoltage protection voltage2 過電圧保護電圧2	FB_OVP2		FB_OVP(MIN) *1.02	FB_OVP(TYP) *1.02	FB_OVP(MAX) *1.02	V
Overvoltage protection musk time2 過電圧保護マスク期間 2	Tovp2mask		-	400	-	ns
過電圧保護2波形Aオン電圧	Vovp2onA		T.B.D	2.5	T.B.D	V
Overvoltage protection sample hold time2 過電圧保護サンプルホールド期間2	Tovp2sh		80	100	120	ns
Clamp voltage (H) クランプ電圧(H)	VCL(H)		6.0	6.5	7.0	V
Clamp voltage (L) クランプ電圧(L)	VCL(L)		-0.9	-0.8	-0.7	V
On dead time オンデッドタイム	Tondead	FB=1.25V OCL=0V	425	500	575	ns
COMP端子 (COMP Terminal)						
Error amplifier output source current エラーアンプ出力ソース電流	Ieaso	FB=1V COMP=1V	-60	-50	-40	μA
Error amplifier output sink current エラーアンプ出力シンク電流	Ieasi	FB=4V COMP=1V	40	50	60	μA
Error amplifier output sink current (SS) ソフトスタート時出力シンク電流	Ieasi(SS)	FB=3V soft start time	50	65	80	μA
Error amplifier output sink current (OVP1) OVP1動作時出力シンク電流	Ieasi(OVP1)	OVP1 mode	0.8	1.0	1.2	mA
Error amplifier output sink current (OVP2) OVP2動作時出力シンク電流	Ieasi(OVP2)	OVP2 mode	0.8	1.0	1.2	mA
Light load intermit threshold voltage 軽負荷間欠用しきい値	Vth(bst)		0.65	0.75	0.85	V
COMP terminal pre charge voltage COMPプレチャージ電圧	Vcomp(pre)		0.55	0.65	0.75	V
軽負荷間欠・プレチャージヒステリシス	Δbst-pre		0.05	0.10	0.15	V
COMP terminal standby voltage COMPスタンバイ電圧	Vcomp(stb)		0.2	0.3	0.4	V
COMPパワー開始電圧	Vcomp(fst)		1.40	1.55	1.70	V
COMPパワー停止電圧	Vcomp(fsp)		1.30	1.45	1.60	V
COMPパワーヒステリシス	Vcomp(fhys)		0.05	0.10	0.15	V
OCL端子 (OCL Terminal)						
Overcurrent protection voltage 過電流保護電圧	VTH_OCL		0.45	0.50	0.55	V
Leading edge blanking time リーディングエッジブランクタイム (※2)	TLEB		-	250	-	ns

(※2) 設計保証

(※2) Design assurance

3-3 Electrical/Thermal Characteristics (at Ta=25°C)

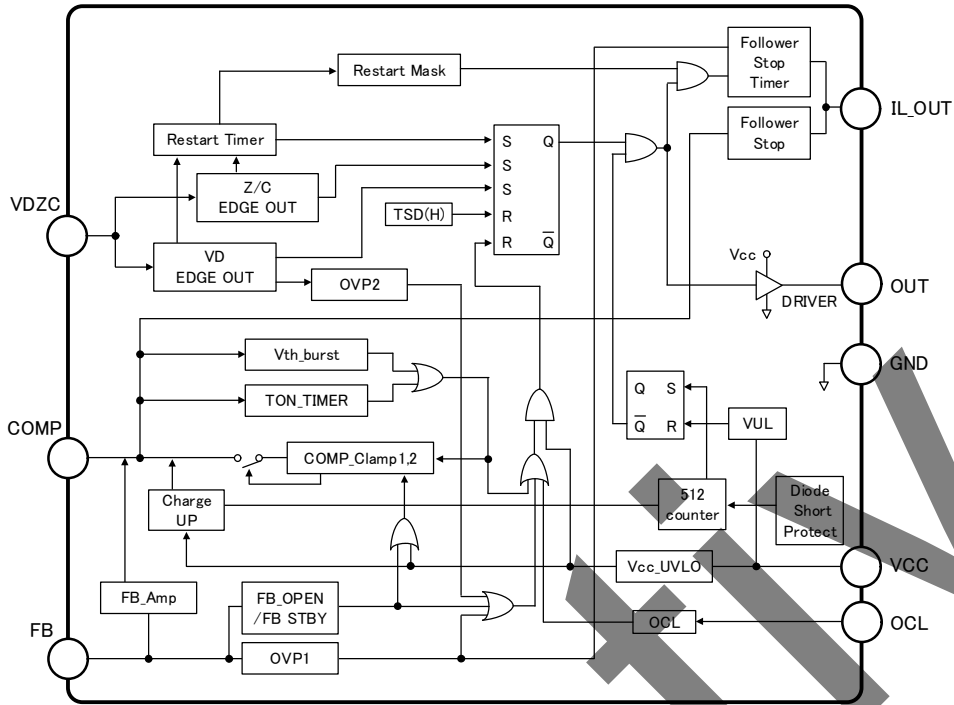
3-3 電氣的・熱的特性 (at Ta=25°C)

Item 項目	Symbol 記号	Condition 条件	Ratings 規格値			Unit 単位
			min	typ	max	
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		40	50	60	mV
SS threshold voltage2 ソフトスタートしきい値電圧2	Vss2		120	150	180	mV
SS threshold voltage3 ソフトスタートしきい値電圧3	Vss3		240	300	360	mV
SS time1 ソフトスタート時間1	Tss1		10	15	20	ms
SS time2 ソフトスタート時間2	Tss2		30	40	50	ms
SS time2 ソフトスタート時間3	Tss3		50	65	80	ms
ON/OFFタイマ機能 (ON/OFF Timer section)						
Minimum on time 最小ON時間	Ton(min)	VCOMP=0.8V	300	400	500	ns
Maximum on time 最大ON時間	Ton(max)	VCOMP=4.5V	24.0	27.5	30.0	μs
Restart time リスタート時間	Trestart		320	400	480	μs
ダイオードショート保護機能 (Diode Short Protection)						
Latch counter ラッチカウンタ	OCL_count	OCL=4V	-	512	-	counts
Latch counter reset VDZC voltage1 ラッチカウンタリセット VDZC電圧1	VDZC_reset1	巻き線検出時	3.5	4.0	4.5	V
Latch counter reset VDZC voltage2 ラッチカウンタリセット VDZC電圧2	VDZC_reset2	巻き線レス検出時	FB-0.08	FB-0.06	FB-0.05	V
過熱保護 (Thermal shutdown protection)						
Operating stop temperature 動作停止温度 (※2)	TSD(H)	VCC=14V VF/B=2.5V	140	-	-	°C
Hysteresis temperature 動作停止/復帰温度幅 (※2)	ΔTSD	VCC=14V VF/B=2.5V	-	40	-	°C

(※2) 設計保証

(※2) Design assurance

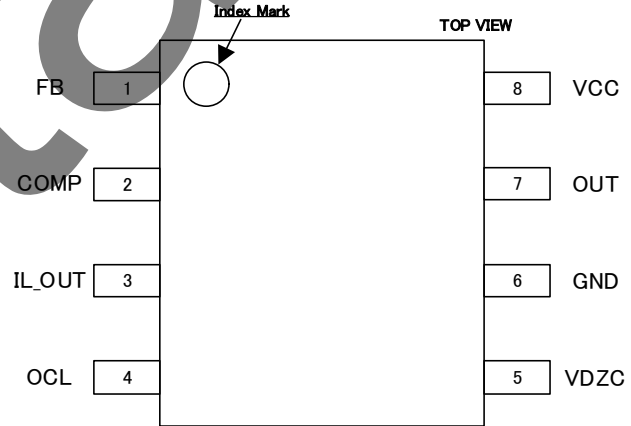
4 Block Diagram
4 ブロック図



5 Pin Function
5 端子機能

Terminal No. 端子番号	Symbol 記号	Terminal Name 端子名称
1	FB	The input terminal of feedback error amplifier フィードバックエラーアンプの入力端子
2	COMP	The output terminal of feedback error amplifier フィードバックエラーアンプの出力端子
3	IL_OUT	The signal output terminal for interleave operation インターリーブ動作作用信号出力端子
4	OCL	The input terminal for over current detection 過電流検出用入力端子
5	VDZC	The input terminal for zero current detection ゼロ電流検出端子
6	GND	Ground Terminal グラウンド端子
7	OUT	The output terminal for a MOSFET drive MOSFET駆動用出力端子
8	VCC	The input terminal for Power supply voltage 電源電圧入力端子

6 Pin Assignment
6 端子配置

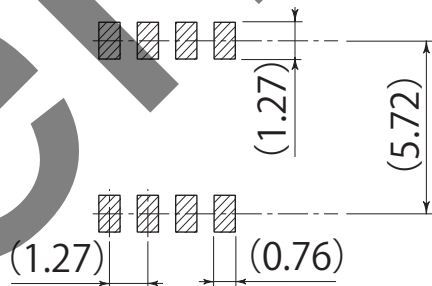
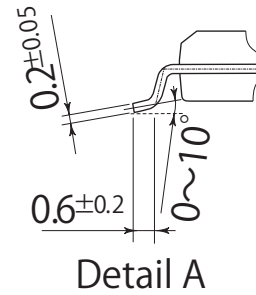
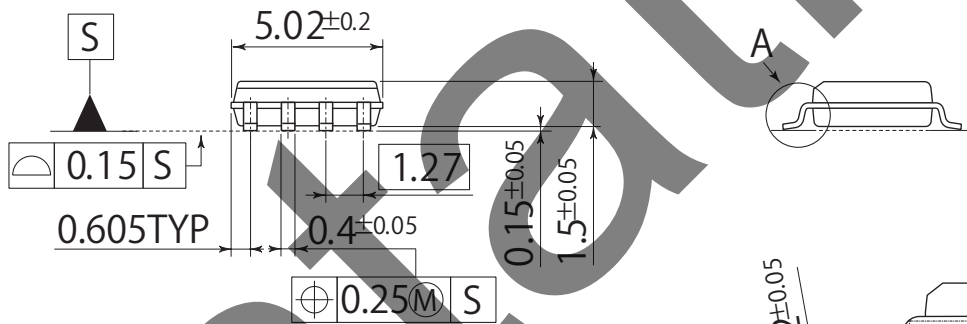
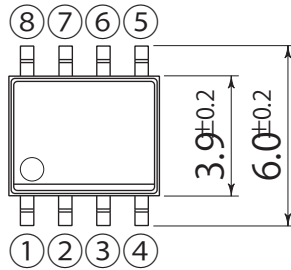


Package Outline-Dimensions

unit : mm
scale: 4/1

L2

JEDEC Code	-
JEITA Code	-
House Name	SOP8J



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.

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U182(2019.02)

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