M62293FP

3.3 V, 2.5 V Fixed 2-Output Voltage DC/DC Converter

REJ03D0853-0300
Rev.3.00
Jun 15, 2007

Description

M62293FP is 3.3 V and 2.5 V fixed stable 2-output step-down DC/DC converter.

It is possible to simplify peripheral circuit and to design compact and low cost sets because this device includes peripheral devices in small size 8-pin package.

The IC also has Reset circuit with time delay that monitors power supply (V_{CC} = 5 V) and one regulator output (Vout1 = 3.3 V; IN1 terminal), therefore an application system is protected system errors.

Especially this is most suitable for application system with microprocessor and ASIC.

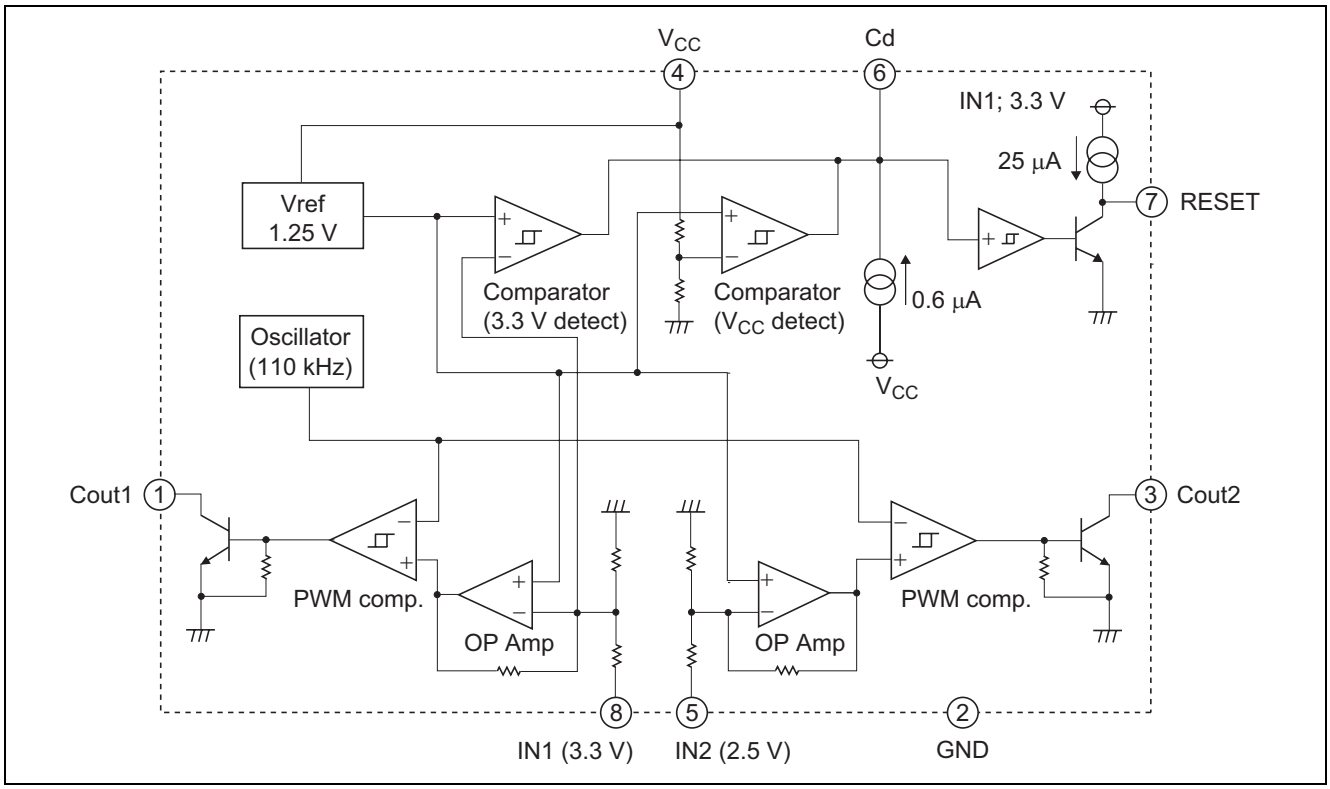
Features

- 3.3 V and 2.5 V step-down converter
- 4 to 15 V wide input supply voltage (V_{CC} = 5 V typ.)
- Reset circuit with time delay monitors
- Supply voltage (V_{CC} = 5 V) and regulator output (3.3 V)
- 110 kHz fixed frequency oscillator without peripheral devices
- 8-pin SOP package

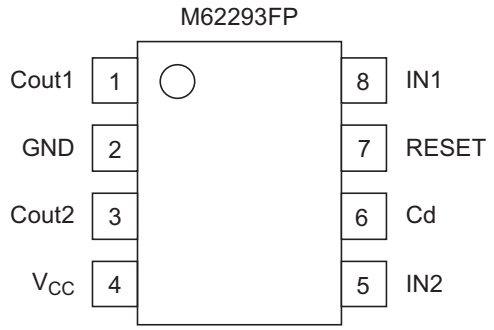
Application

Application system with microprocessor and ASIC

Block Diagram



Pin Arrangement



Outline: PRSP0008DE-C (recommend)
PRSP0008DA-A (8P2S-A) (not recommend for new design)

Absolute Maximum Ratings

(Ta = 25°C, unless otherwise noted)

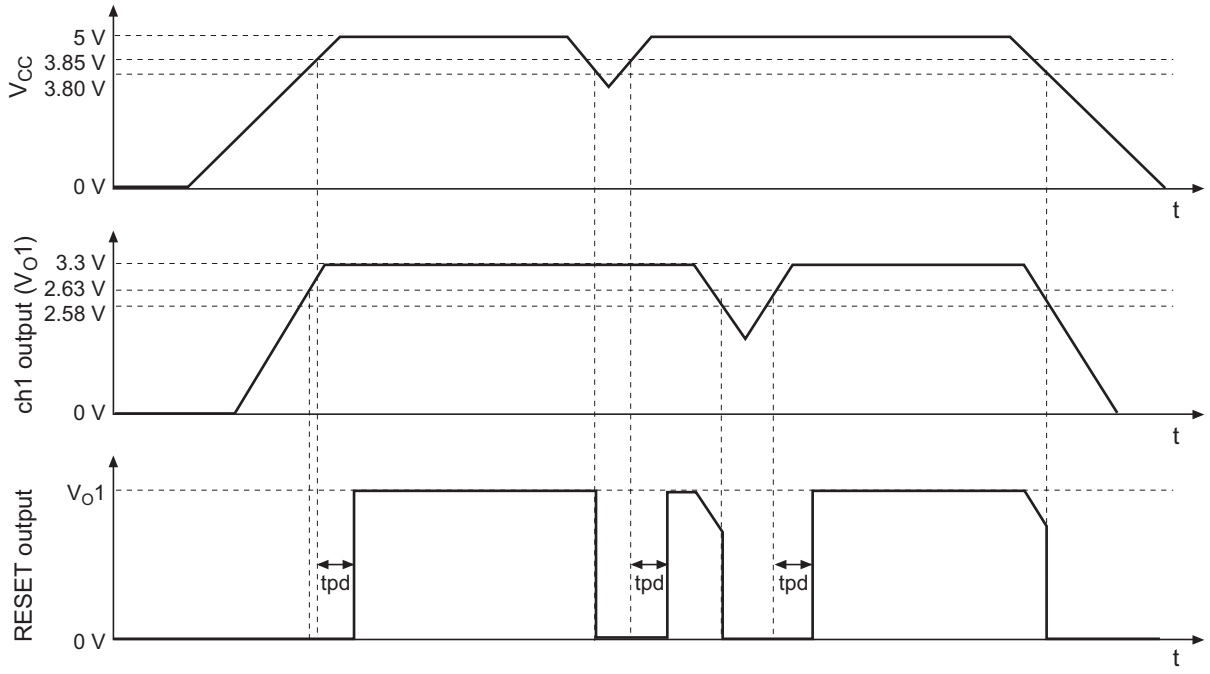
Item	Symbol	Ratings	Unit	Conditions
Supply voltage	V_{CC}	16	V	
Output current (DC/DC converter block)	I_O	30	mA	ch1, ch2
Output current (Reset block)	I_{ORESET}	6	mA	
Power dissipation	Pd	440	mW	Ta = 25°C
Thermal derating	Kθ	4.4	mW/°C	Ta > 25°C
Operating temperature	Topr	–20 to +85	°C	
Storage temperature	Tstg	–40 to +125	°C	

Electrical Characteristics

(Ta = 25°C, V_{CC} = 5 V, unless otherwise noted)

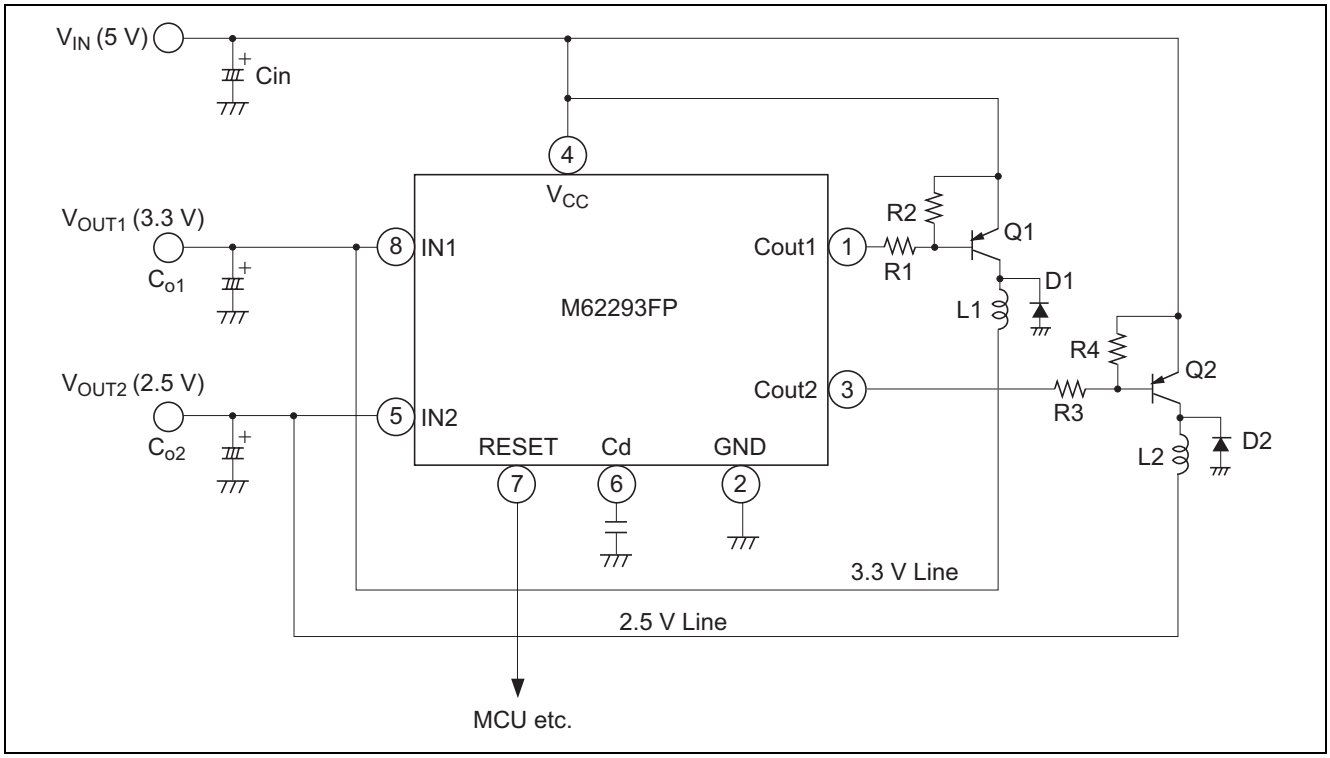
Block	Item	Symbol	Limits			Unit	Test Condition
			Min	Typ	Max		
All blocks	Supply voltage	V_{CC}	4.0	5.0	15	V	
	Supply current	I_{CC}	—	1.5	2.8	mA	Without load
DC/DC converter block							
Error Amp.	Output voltage	V_O1	3.15	3.30	3.45	V	ch1 output
		V_O2	2.37	2.50	2.63		ch2 output
	Line regulation	Vreg-L	—	5	15	mV	V_{CC} = 4 to 12 V
	Input current 1	Iin	—	150	450	μA	ch1
	Input current 2	Iin	—	100	300	μA	ch2
Oscillator	Oscillator frequency	f_{OSC}	65	110	160	kHz	
Output	Maximum on duty	T_{DUTY}	—	90	—	%	
	Output leakage current	I_{CL}	–1	—	1	V	V_{CC} = 12 V, V_C = 12 V
	Output saturation voltage	Vsat	—	1.2	2.0	V	I_O = 10 mA, Darlington connection
Reset circuit block							
Reset circuit	Detecting voltage 1	Vs1	3.6	3.8	4.0	V	V_{CC} = 5 V detection
	Hysteresis voltage 1	ΔVs1	30	50	80	mV	
	Detecting voltage 2	Vs2	2.46	2.58	2.70	V	ch1 output (3.3 V) detection
	Hysteresis voltage 2	ΔVs2	30	50	80	mV	
	Cd output current	I_{PD}	–1.1	–0.6	–0.3	μA	
	Delay time	tpd	5	10	20	ms	Cd = 4700 pF
	RESET output current	I_{OC}	–40	–25	–17	μA	V_{CC} = 5 V, V_O = 1/2 × V_{CC}
	RESET low voltage	V_{OL}	—	—	0.2 V_O1	V	I_{ORESET} = 4 mA
	RESET high voltage	V_{OH}	0.8 V_O1	—	—	V	

Reset Block Timing Chart



Note: tpd: RESET delay time·····tpd (ms) $\approx 2.13 \times 10^{-3} \times$ Cd (pF)

Application Circuit (3.3 V and 2.5 V 2-output Voltage DC/DC Converter)



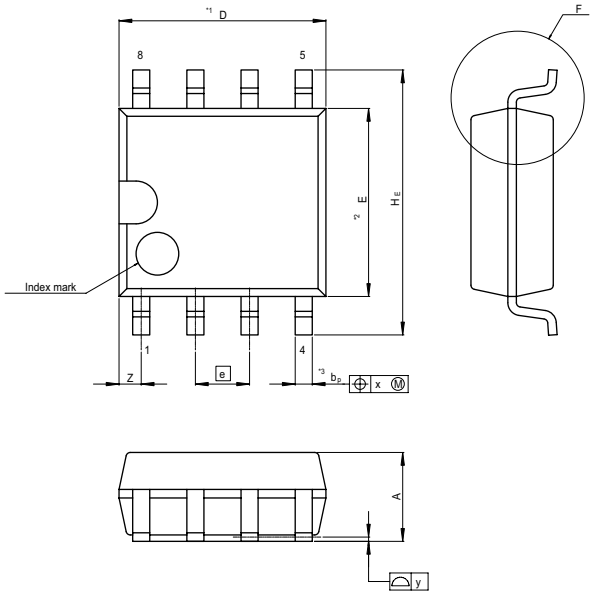
The Expression of Circuit Constants

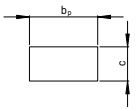
Constants	Expressions
$\frac{T_{ON}}{T_{OFF}}$	$\frac{V_O + V_F}{V_{IN} - V_{CE\ (sat)} - V_O}$
$(T_{ON} + T_{OFF})_{MAX}$	$\frac{1}{f_{OSC}}$ f_{OSC}: 110 kHz (V_{CC} = 5 V)
$T_{OFF\ (MIN)}$	$(T_{ON} + T_{OFF}) / (1 + \frac{T_{ON}}{T_{OFF}})$
$T_{ON\ (MAX)}$	$\frac{1}{f_{OSC}} - T_{OFF}$
$L_{\ (MIN)}$	$\frac{(V_{IN} - V_{CE\ (sat)} - V_O) \times T_{ON\ (MAX)}}{\Delta I_O}$
Ipk	$I_O + \frac{1}{2} \Delta I_O$

Note: V_F: Forward voltage drop of an external diode.
Vsat: Output saturation voltage of an external switching transistor.
ΔI_O: Set to 1/3 to 1/5 of maximum output current.
Choose an external transistor, diode and inductor with peak current rating approximately greater than "Ipk".

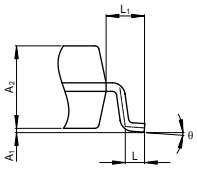
Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-4.4x4.85-1.27	PRSP0008DE-C	—	0.1g





Terminal cross section
(Ni/Pd/Au plating)

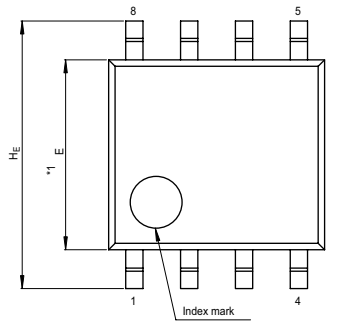


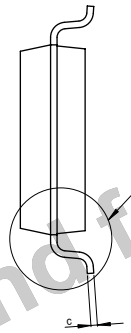
Detail F

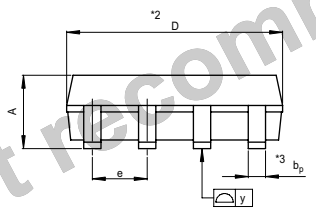
NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT INCLUDE TRIM OFFSET.

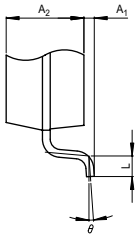
Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	4.65	4.85	5.05
E	4.2	4.4	4.6
A_2	—	1.85	—
A_1	0.00	0.1	0.20
A	—	—	2.03
b_p	0.34	0.4	0.46
b_1	—	—	—
c	0.15	0.20	0.25
c_1	—	—	—
θ	0°	—	8°
H_E	5.7	6.2	6.5
e	1.12	1.27	1.42
x	—	—	0.12
y	—	—	0.10
Z	—	—	0.75
L	0.25	0.45	0.65
L_1	—	0.90	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-4.4x5-1.27	PRSP0008DA-A	8P2S-A	0.07g









Detail F

NOTE)
1. DIMENSIONS "*1" AND "*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION "*3" DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	4.8	5.0	5.2
E	4.2	4.4	4.6
A_2	—	1.5	—
A_1	0.05	—	—
A	—	—	1.9
b_p	0.35	0.4	0.5
c	0.13	0.15	0.2
θ	0°	—	10°
H_E	5.9	6.2	6.5
e	1.12	1.27	1.42
y	—	—	0.1
L	0.2	0.4	0.6

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