M62203FP

3.3 V, 2.7 V Two-Channel Fixed-Output General-Purpose DC-DC Converter

REJ03F0094-0100Z
Rev.1.0
Sep.19.2003

Description

The M62203FP is an integrated circuit developed as a two-channel (3.3 V and 2.7 V) fixed-output general-purpose DC-DC converter.

Peripheral elements are incorporated in a small 8-pin package, enabling peripheral circuitry to be simplified, and compact, low-cost set design to be achieved.

In addition, the M62203FP has an on-chip reset circuit that monitors power supply voltage VCC (5 V) and output voltage Vout (3.3 V), enabling erroneous system operation to be prevented.

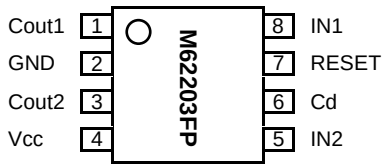
Features

- Wide operating power supply voltage range: 4 to 15 V (5 V Typ.)
- Low current dissipation: 1.0 mA (VCC = 5 V, no load)
- On-chip 5 V, 3.3 V dual voltage system detection reset circuitry
- On-chip oscillation circuit not requiring peripheral elements (110 kHz Typ.)
- 8-pin SOP package

Applications

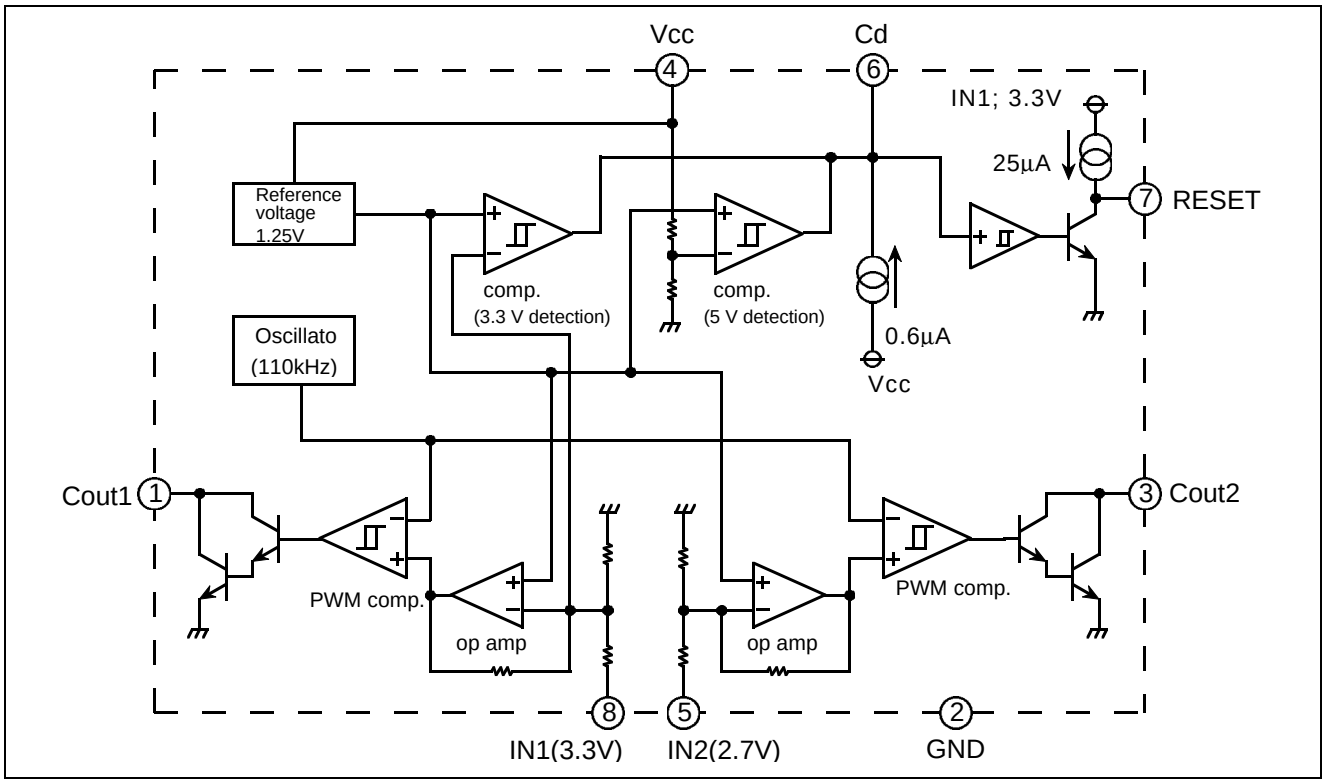
General electronic products such as mobile and portable devices

Pin Configuration (Top View)



Package: 8P2S-A

Block Diagram



Absolute Maximum Ratings

Unless specified otherwise noted, Ta = 25ºC)

Item	Symbol	Ratings	Unit	Conditions
Power supply voltage	Vcc	16	V	
DC-DC converter block output drive current	Io	30	mA	ch1, ch2
Reset circuit block output inflow current	IoRESET	6	mA	
Internal power consumption	Pd	440	mW	Ta = 25°C
Thermal reduction ratio	Kθ	4.4	mW/ºC	Ta > 25°C
Operating ambient temperature	Topr	–20 to +85	ºC	
Storage temperature	Tstg	–40 to +125	ºC	

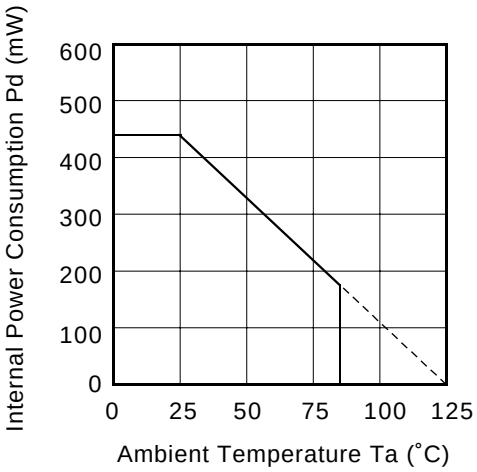
Electrical Characteristics

(Unless specified otherwise noted, VCC = 5 V, Ta = 25ºC)

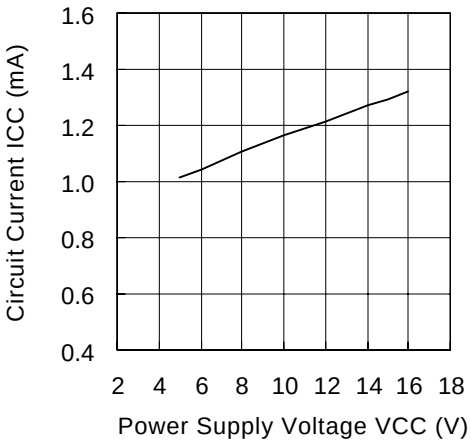
Block	Item	Symbol	Limits			Unit	Test Conditions
			Min.	Typ.	Max.		
All blocks	Power supply voltage range	Vcc	4.0	5.0	15	V	
	Current dissipation	Icc	—	1.0	1.5	mA	No output load
DC-DC converter block							
Error amp	Output voltage	Vo1	3.15	3.30	3.45	V	Ch1 output
		Vo2	2.57	2.70	2.83		Ch2 output
	Line regulation	Vreg-L	—	5	15	mV	
	Input current 1	Iin	—	150	450	µA	
	Input current 2	Iin	—	100	300	µA	
Oscillator	Oscillation frequency	fosc	65	110	160	KHz	
Output	Maximum on-duty	TDUTY	—	90	—	%	
	Output leakage current	ICL	–1	—	1	V	
	Output saturation voltage	Vsat	—	1.2	2.0	V	Io = 10 mA, Darlington connection type
Reset block							
Reset circuit	Detection voltage 1	Vs1	3.8	4.0	4.2	mV	VCC = 5 V detection
	Hysteresis voltage 1	ΔVs1	30	50	80	V	
	Detection voltage 2	Vs2	2.57	2.70	2.83	mV	Ch1 output (3.3 V) detection
	Hysteresis voltage 2	ΔVs2	30	50	80	µA	
	Delay constant current	IPD	–1.1	–0.6	–0.3	msec	
	Delay time	tpd	5	10	20	µA	Cd = 4700pF
	Output constant current	IOC	–40	–25	–17	µA	Vcc = 5V, Vo = 1/2 × Vcc
	Output low voltage	VOL	—		0.2Vo1	V	IoRESET = 4mA
	Output high voltage	VOH	0.8Vo1		—	V	

Electrical Characteristic Curves

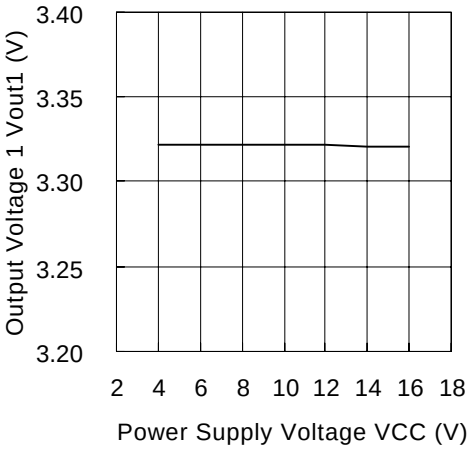
Thermal Reduction Curve (Maximum Rating)



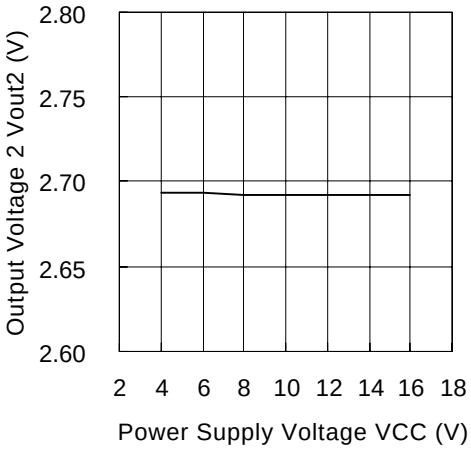
Circuit Current - Power Supply Voltage Characteristic



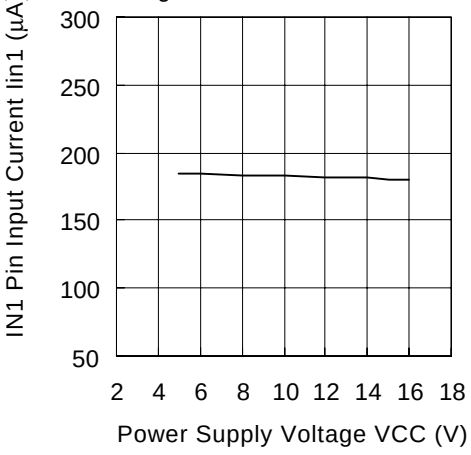
Output Voltage 1 - Power Supply Voltage Characteristic



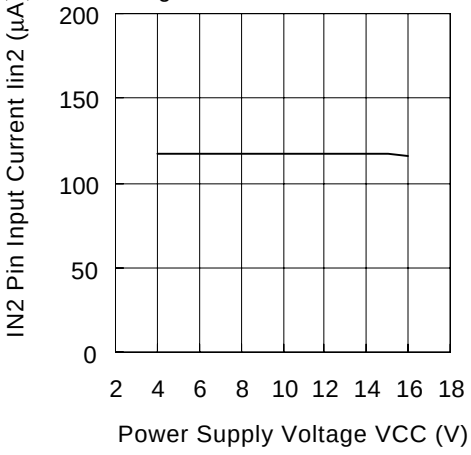
Output Voltage 2 - Power Supply Voltage Characteristic



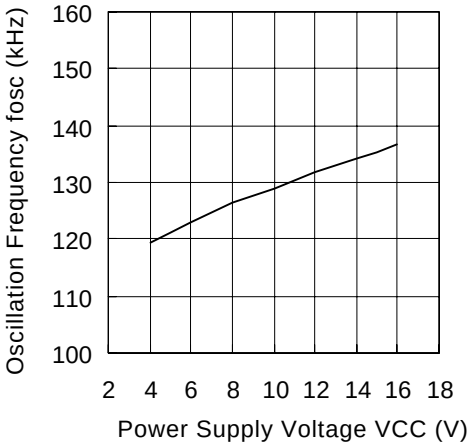
IN1 Pin Input Current - Power Supply Voltage Characteristic



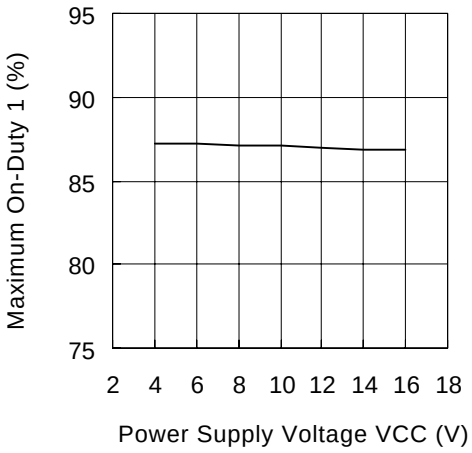
IN2 Pin Input Current - Power Supply Voltage Characteristic



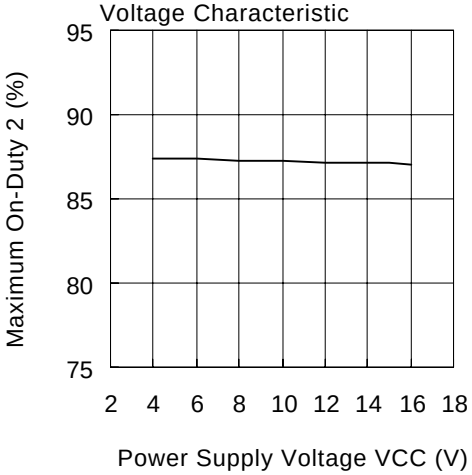
Oscillation Frequency - Power Supply Voltage Characteristic



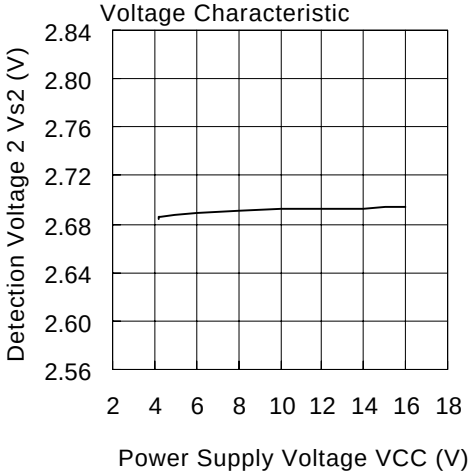
Maximum On-Duty 1 - Power Supply Voltage Characteristic



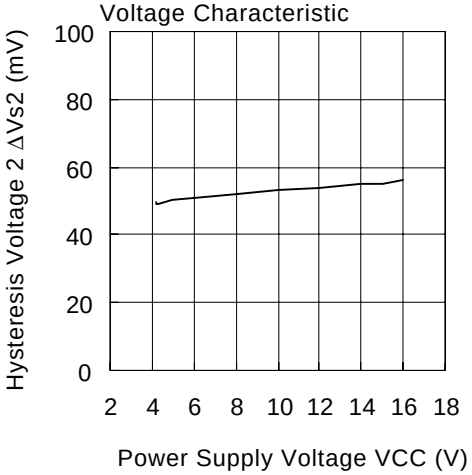
Maximum On-Duty 2 - Power Supply Voltage Characteristic



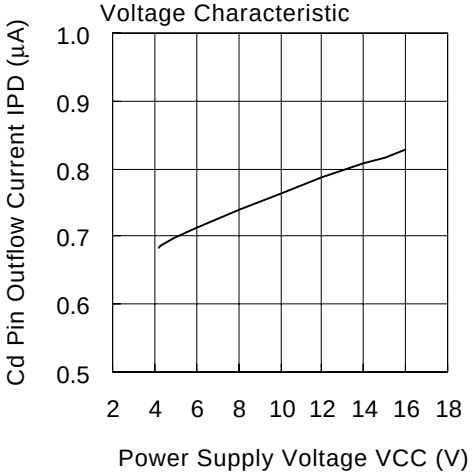
Detection Voltage 2 - Power Supply Voltage Characteristic



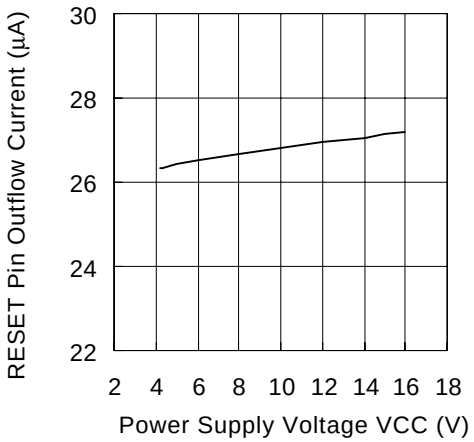
Hysteresis Voltage 2 - Power Supply Voltage Characteristic



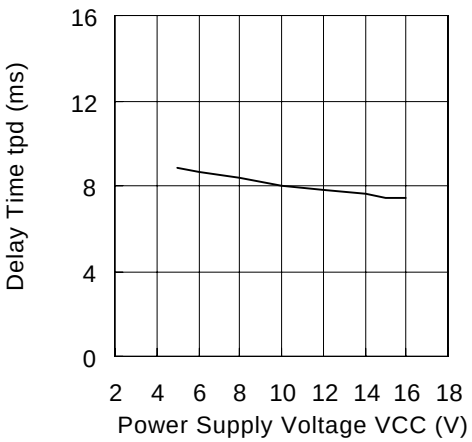
Cd Pin Outflow Current - Power Supply Voltage Characteristic



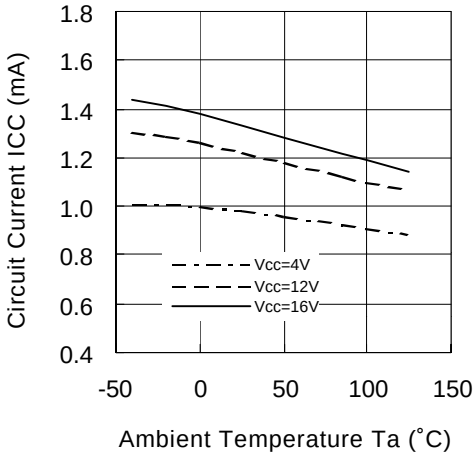
RESET Pin Outflow Current - Power Supply Voltage Characteristic



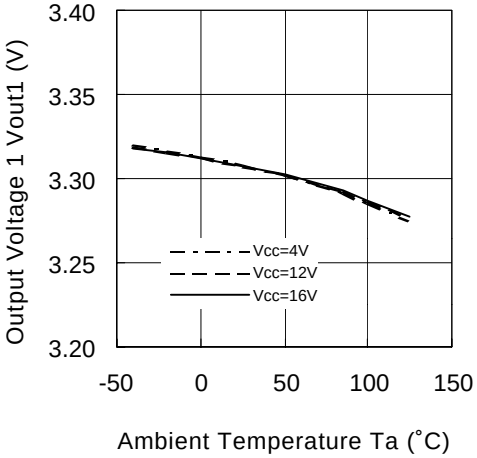
Delay Time - Power Supply Voltage Characteristic



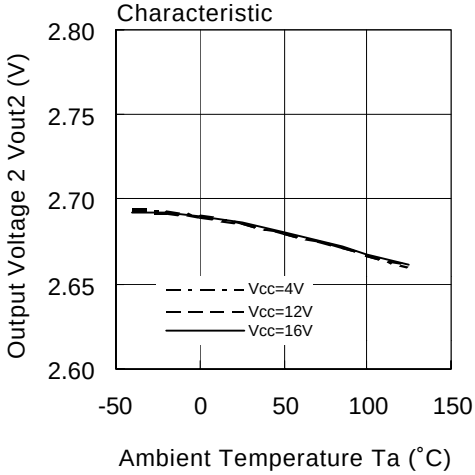
Circuit Current - Temperature Characteristic



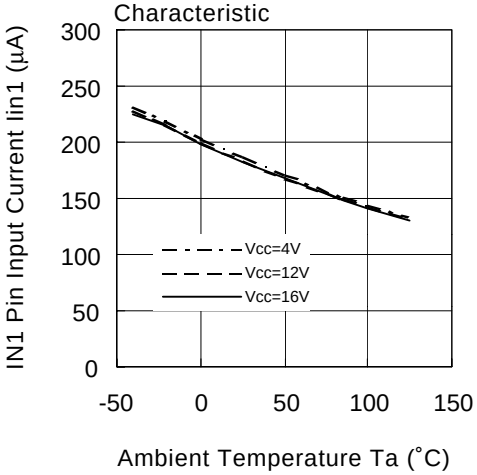
Output Voltage 1 - Temperature Characteristic



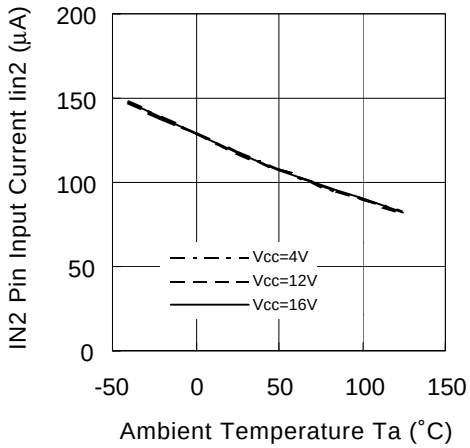
Output Voltage 2 - Temperature Characteristic



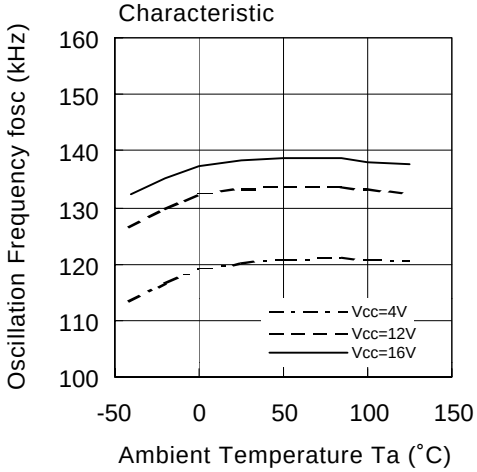
IN1 Pin Input Current - Temperature Characteristic



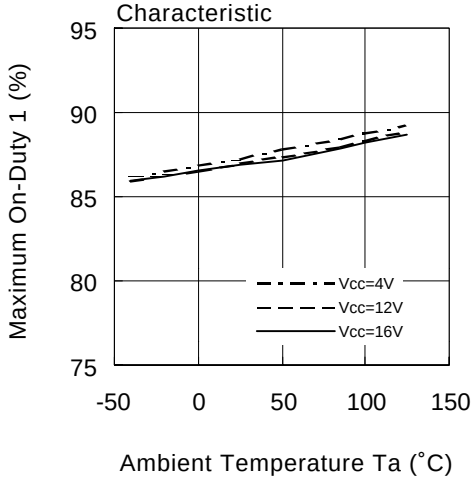
IN2 Pin Input Current - Temperature Characteristic



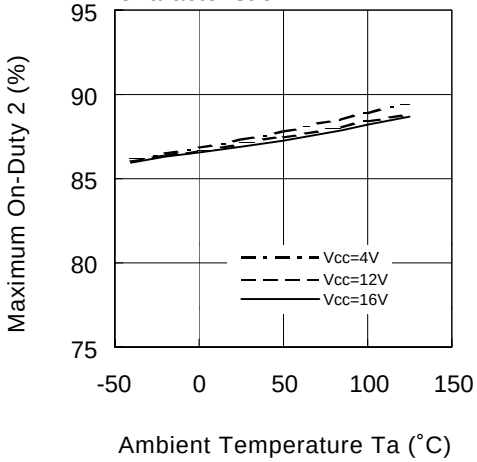
Oscillation Frequency - Temperature Characteristic



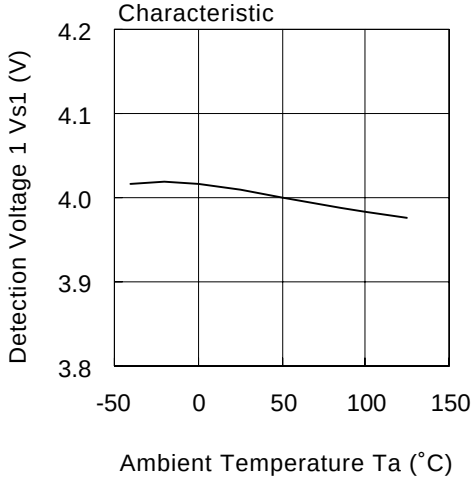
Maximum On-Duty 1 - Temperature Characteristic



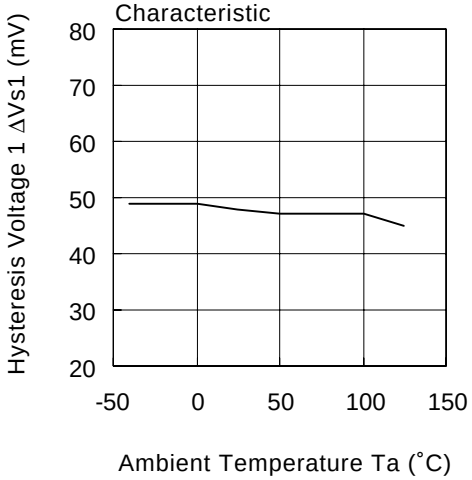
Maximum On-Duty 2 - Temperature Characteristic



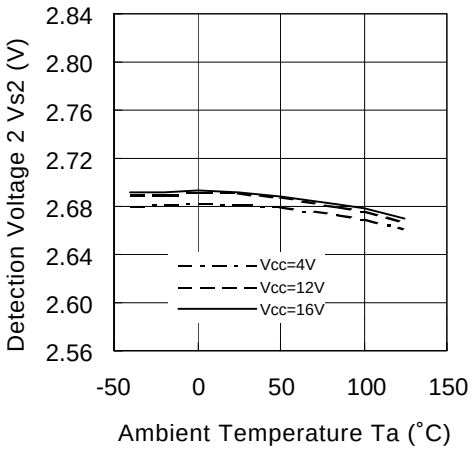
Detection Voltage 1 - Temperature Characteristic



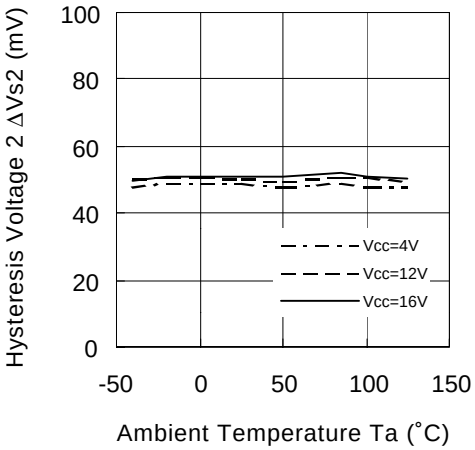
Hysteresis Voltage 1 - Temperature Characteristic



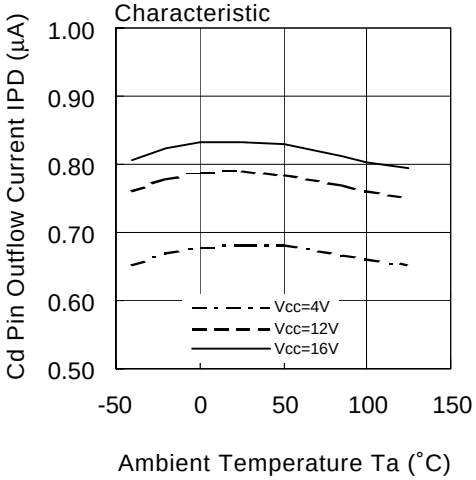
Detection Voltage 2 - Temperature Characteristic



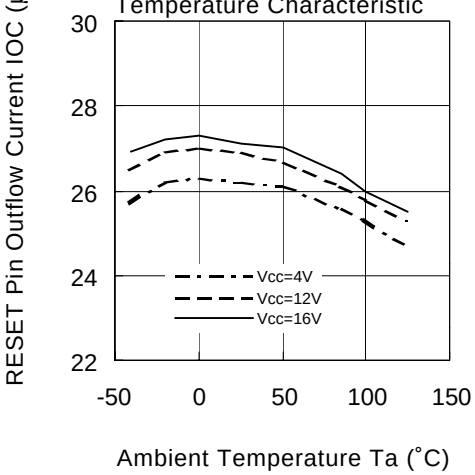
Hysteresis Voltage 2 - Temperature Characteristic



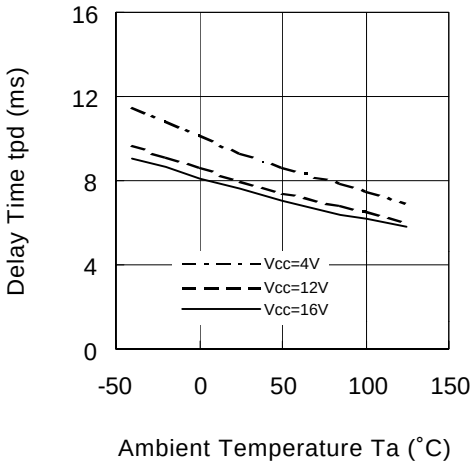
Cd Pin Outflow Current - Temperature Characteristic



RESET Pin Outflow Current - Temperature Characteristic

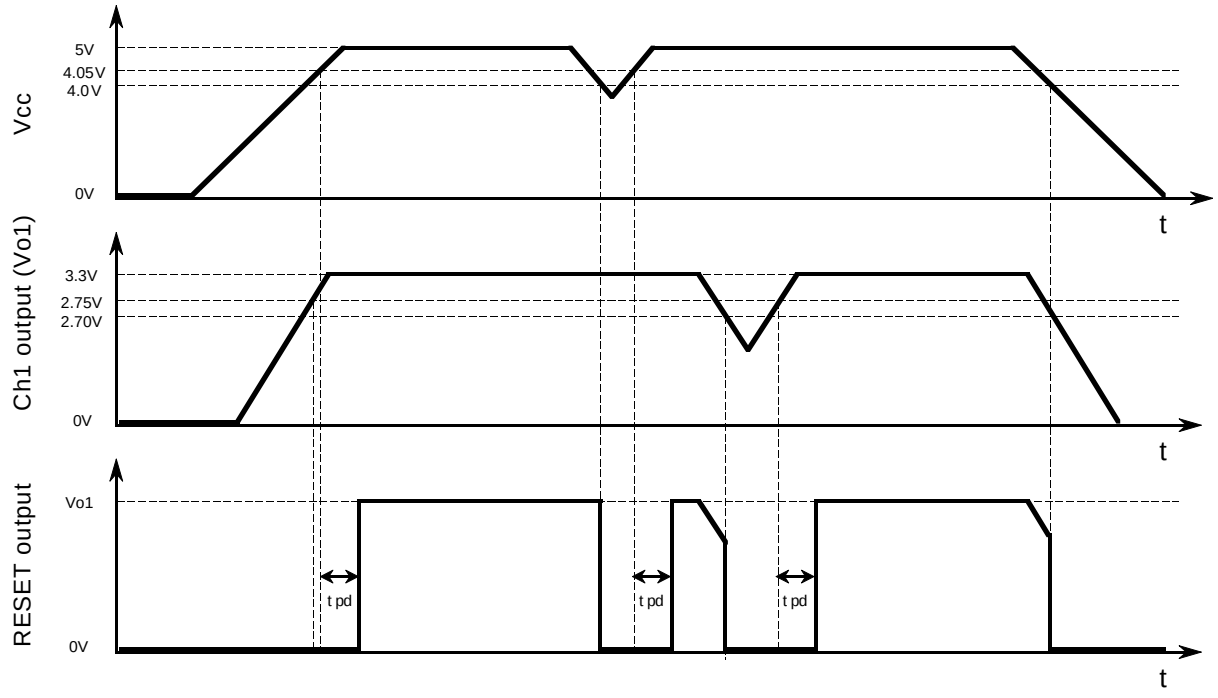


Delay Time - Temperature Characteristic



Reset Circuit Operation

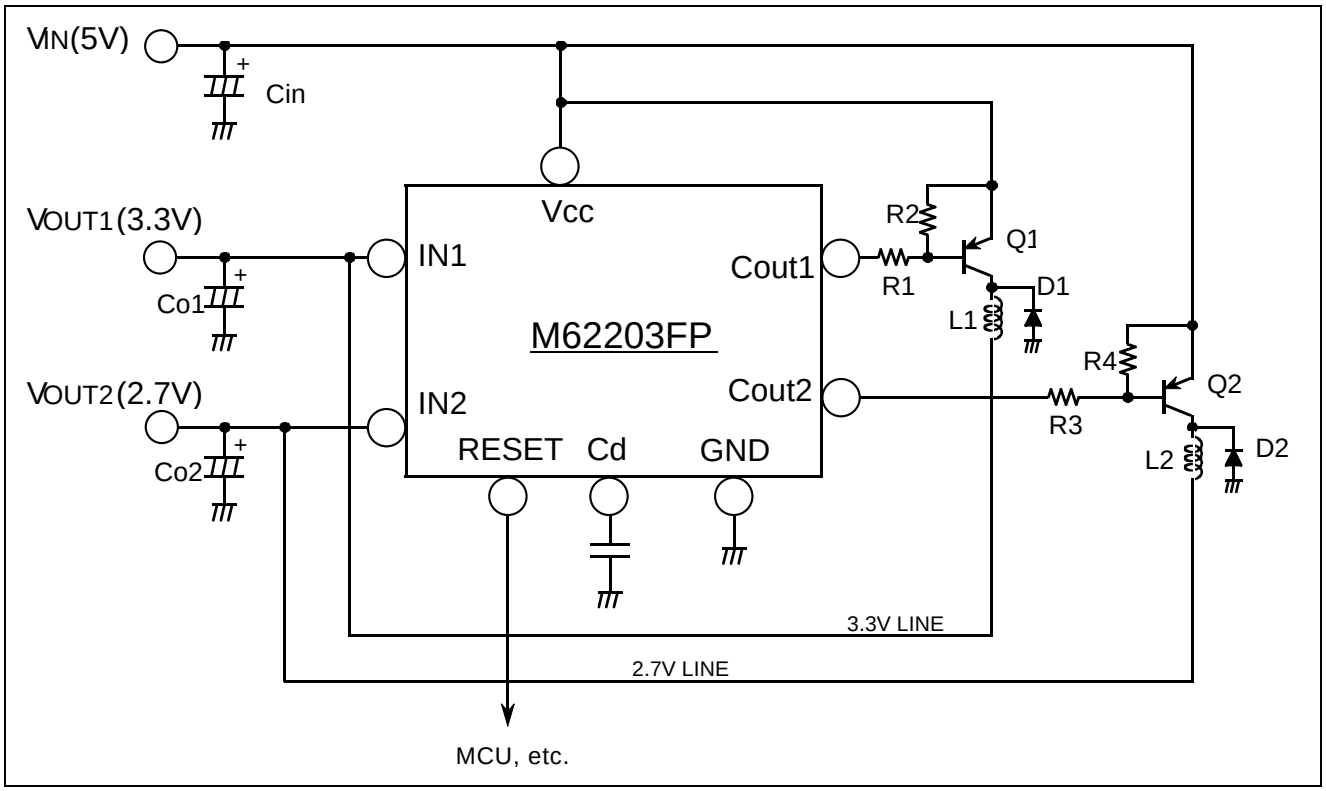
Reset Circuit Block Timing Chart



tpd: Delay time • • •

tpd (msec) ≒ 2.13 × 10^{-3} × Cd (pF)

Application Example (3.3 V, 2.7 V Dual-Output DC-DC Converter)

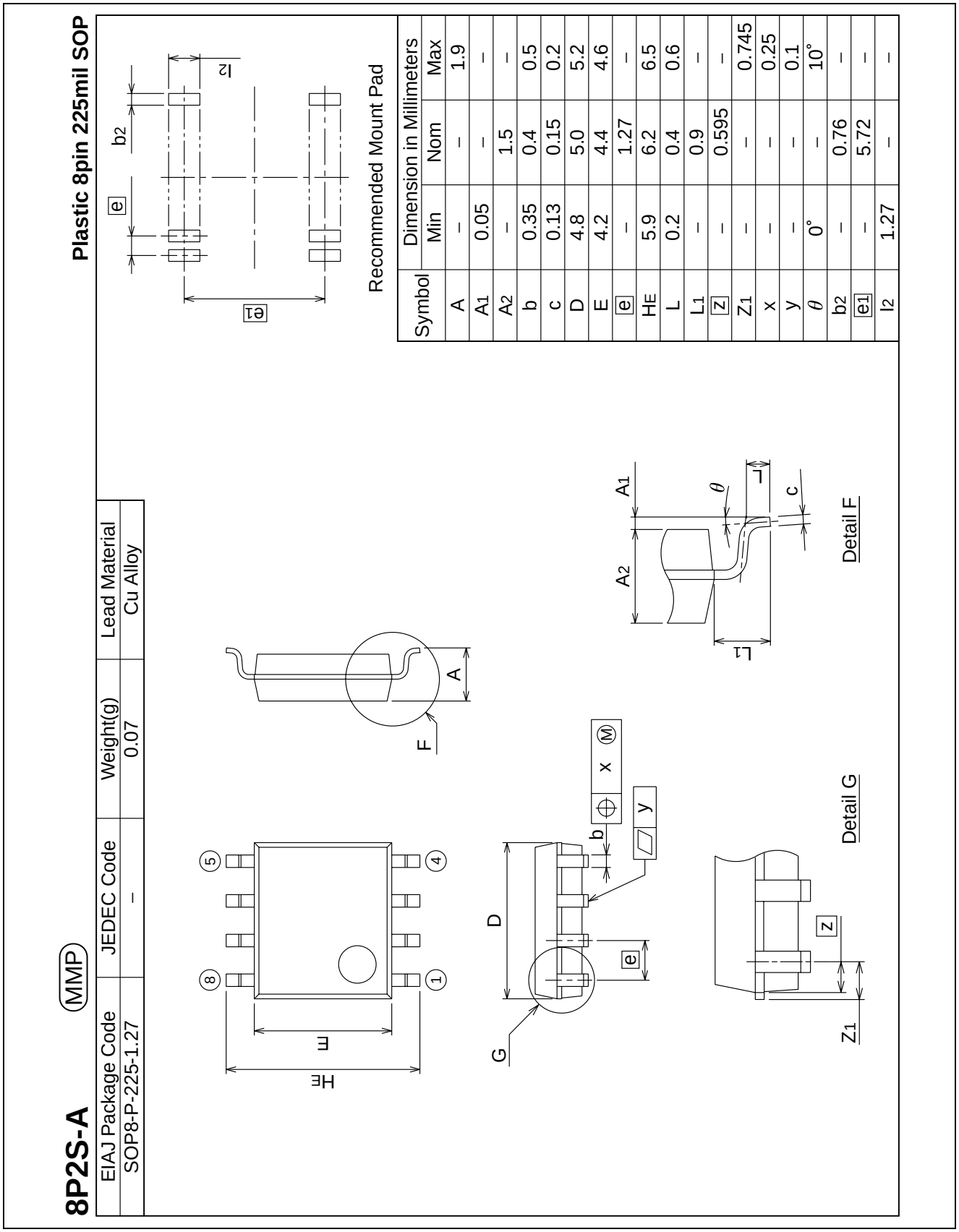


Constant Determination Equations

Constant	Calculation Equation
$\frac{T_{ON}}{T_{OFF}}$	$\frac{V_O+V_F}{V_{IN}-V_{CE(sat)}-V_O}$
$(T_{ON}+T_{OFF})_{MAX}$	$\frac{1}{fosc}$ fosc:110KHz(Vcc=5V)
$T_{OFF(MIN)}$	$(T_{ON}+T_{OFF})\,/\,(1+\frac{T_{ON}}{T_{OFF}})$
$T_{ON(MAX)}$	$\frac{1}{fosc}-T_{OFF}$
$L_{(MIN)}$	$\frac{(V_{IN}-V_{CE(sat)}-V_O)\times T_{ON(MAX)}}{\Delta Io}$
Ipk	$Io+\frac{1}{2}\Delta Io$

Notes:
- VF: Forward voltage of external diode
- Vsat: Output saturation voltage of external transistor
- ΔIo: Set to 1/5 to 1/3 of the maximum load current.
- Use an external transistor Tr., diode D, and inductor L with a current rating of Ipk or above.

Package Dimensions



Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	–	–	1.9
A_1	0.05	–	–
A_2	–	1.5	–
b	0.35	0.4	0.5
c	0.13	0.15	0.2
D	4.8	5.0	5.2
E	4.2	4.4	4.6
e	–	1.27	–
H_E	5.9	6.2	6.5
L	0.2	0.4	0.6
L_1	–	0.9	–
z	–	0.595	–
Z_1	–	–	0.745
x	–	–	0.25
y	–	–	0.1
θ	0°	–	10°
b_2	–	0.76	–
e1	–	5.72	–
l_2	1.27	–	–

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