

# 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

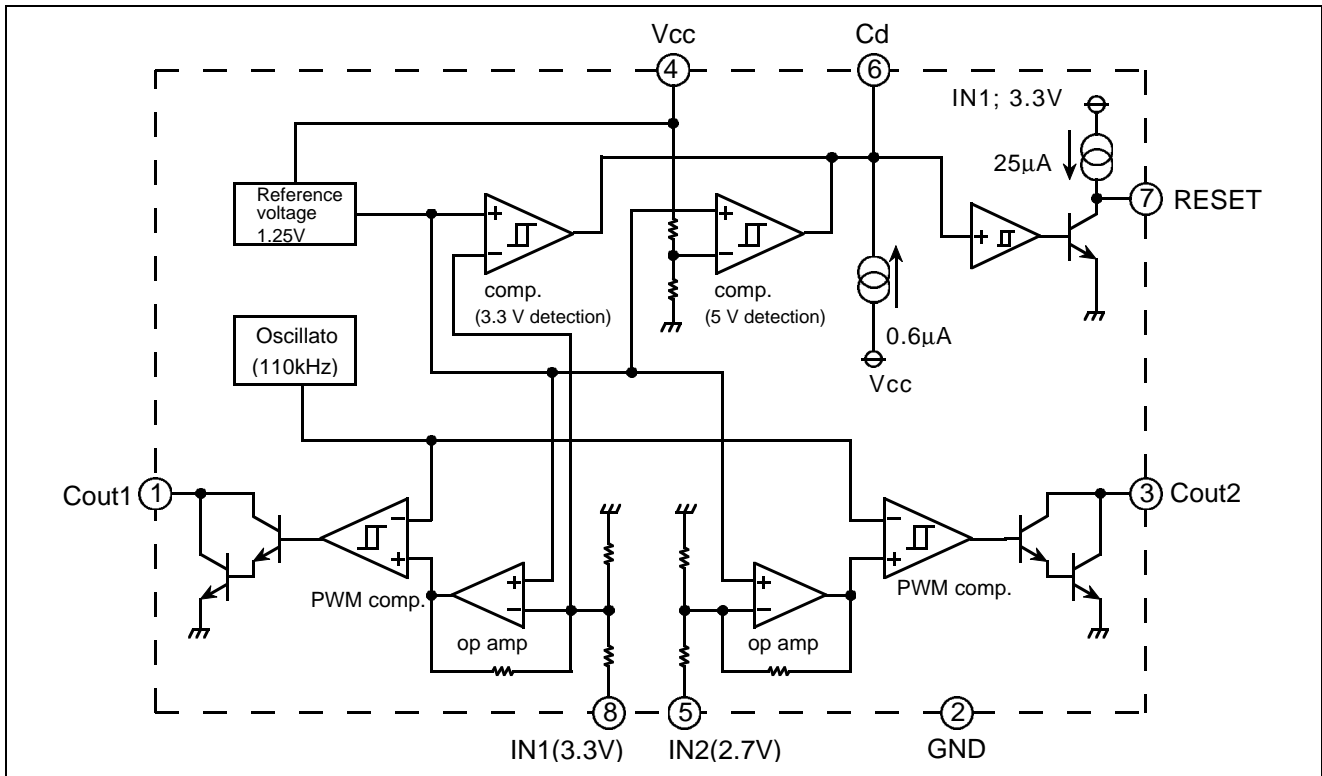
### Applications

General electronic products such as mobile and portable devices

### Pin Configuration (Top View)



Block Diagram



Absolute Maximum Ratings

Unless specified otherwise noted, Ta = 25°C

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/°C	Ta > 25°C
Operating ambient temperature	Topr	-20 to +85	°C	
Storage temperature	Tstg	-40 to +125	°C	

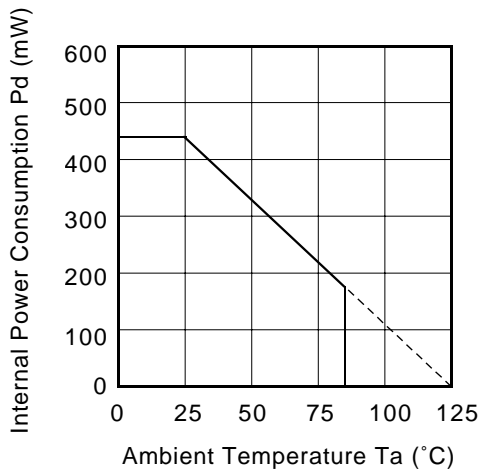
## Electrical Characteristics

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

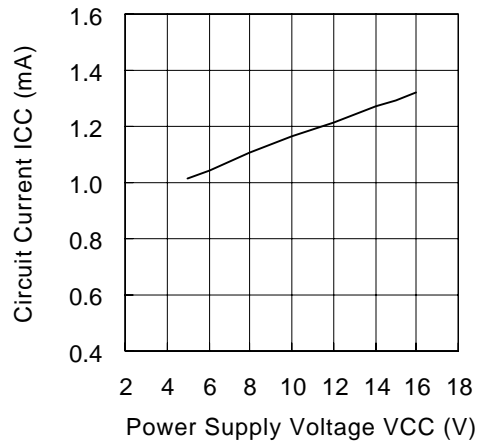
Block	Item	Symbol	Limits			Unit	Test Conditions
			Min.	Typ.	Max.		
All blocks	Power supply voltage range	Vcc	4.0	5.0	15	V	
	Current dissipation	Icc	—	1.0	1.5	mA	No output load
DC-DC converter block							
Error amp	Output voltage	Vo1	3.15	3.30	3.45	V	Ch1 output
		Vo2	2.57	2.70	2.83		Ch2 output
	Line 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

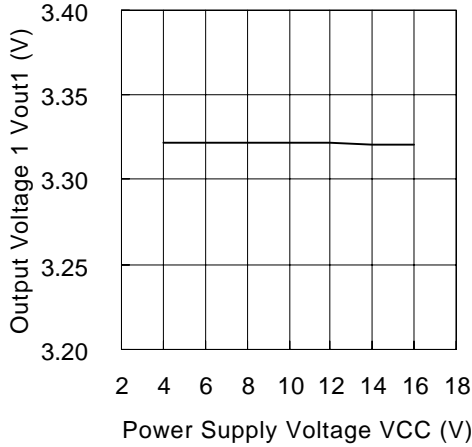
Thermal Reduction Curve (Maximum Rating)



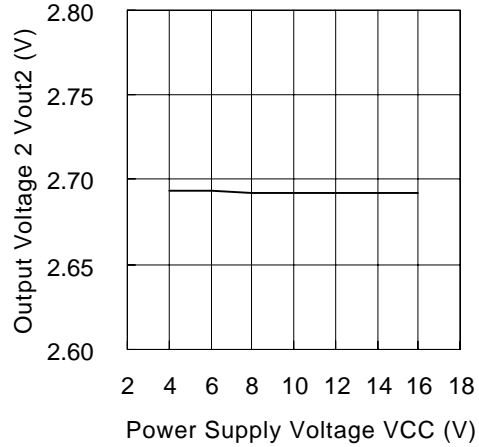
Circuit Current - Power Supply Voltage Characteristic



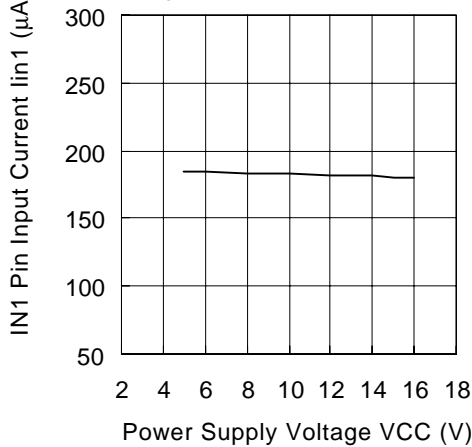
Output Voltage 1 - Power Supply Voltage Characteristic



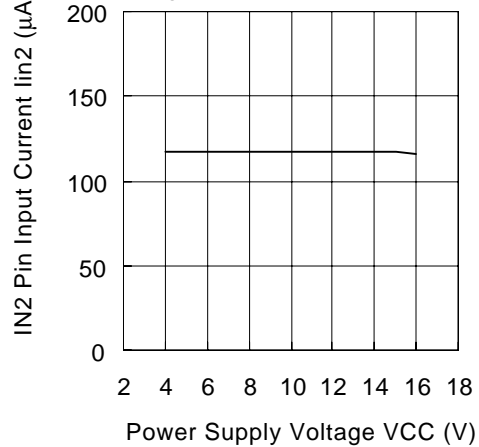
Output Voltage 2 - Power Supply Voltage Characteristic



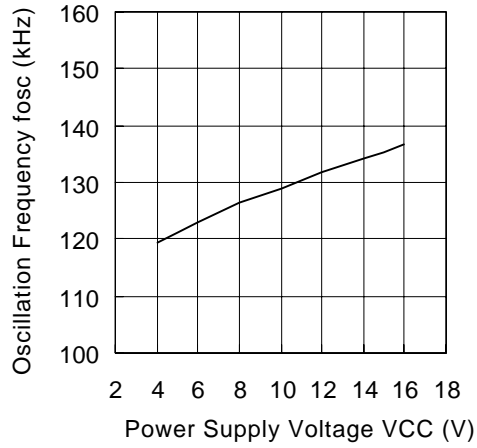
IN1 Pin Input Current - Power Supply Voltage Characteristic



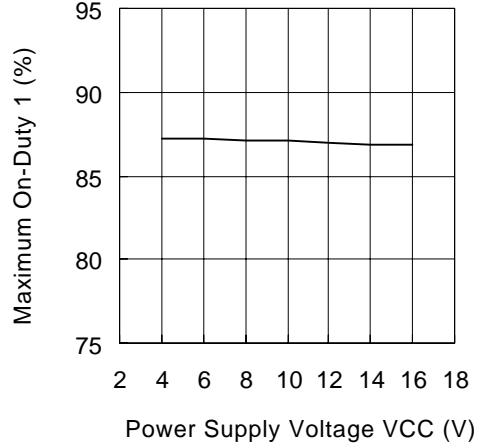
IN2 Pin Input Current - Power Supply Voltage Characteristic



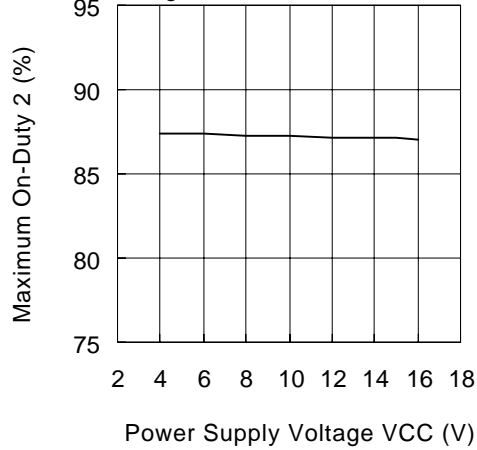
Oscillation Frequency - Power Supply Voltage Characteristic



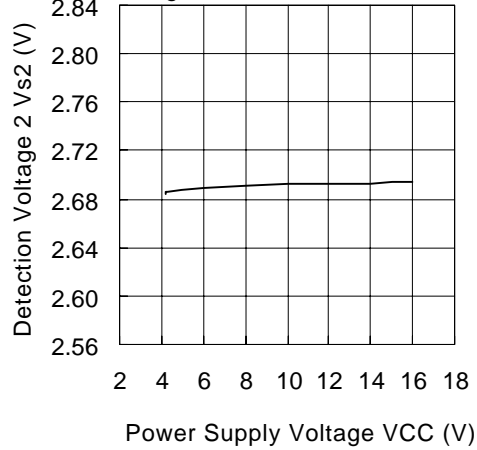
Maximum On-Duty 1 - Power Supply Voltage Characteristic



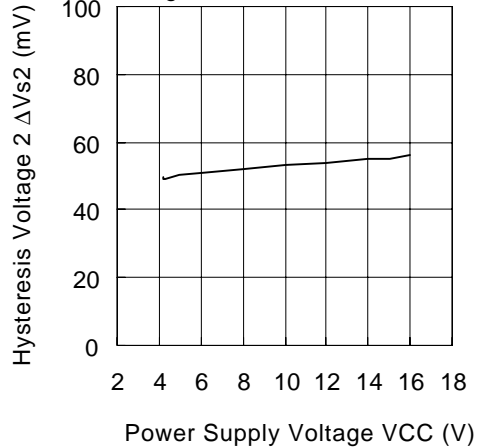
Maximum On-Duty 2 - Power Supply Voltage Characteristic



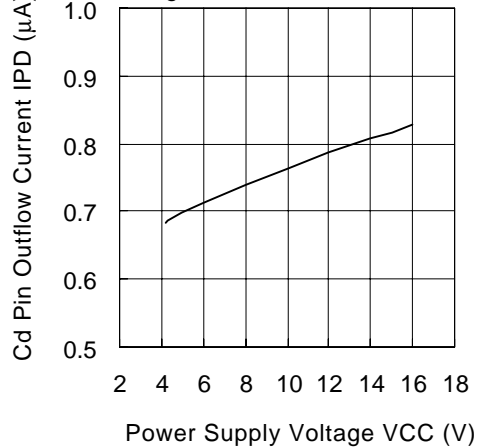
Detection Voltage 2 - Power Supply Voltage Characteristic

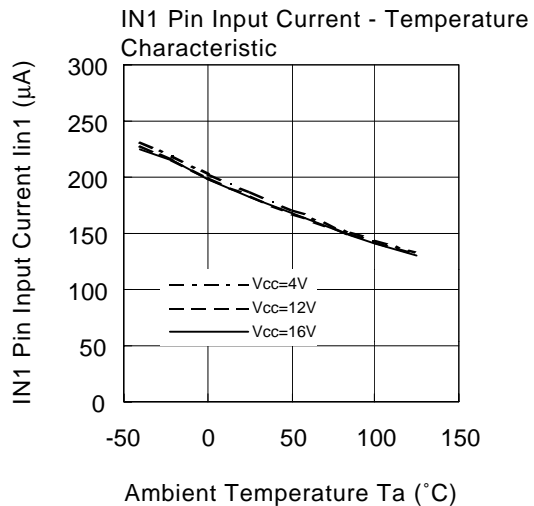
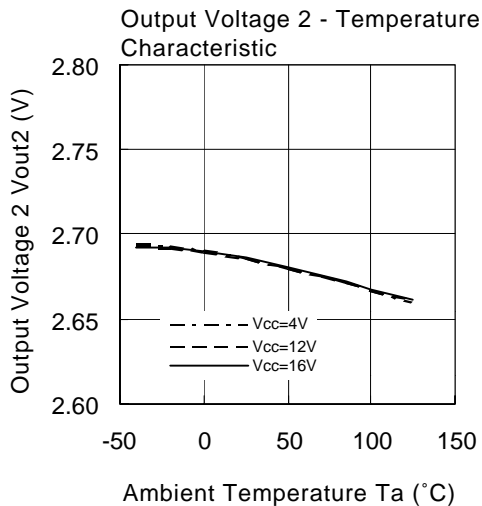
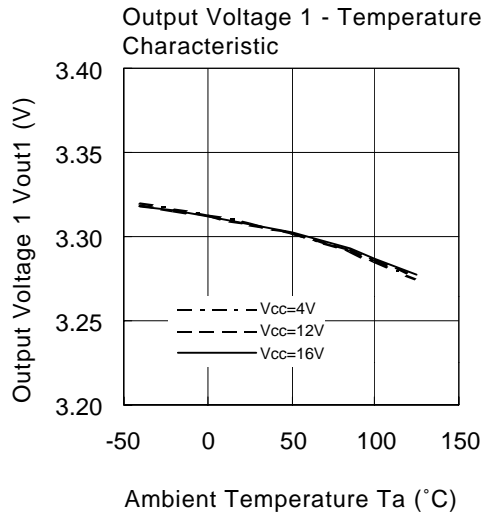
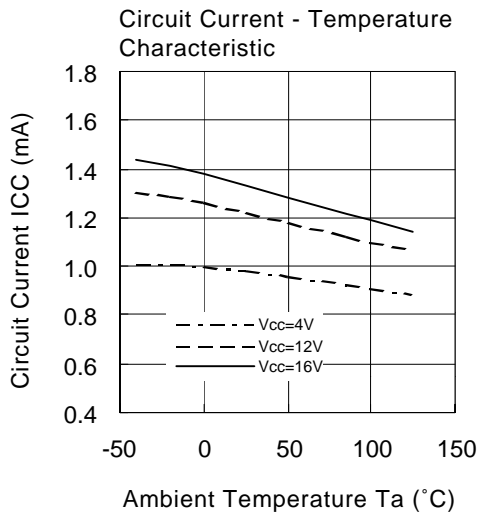
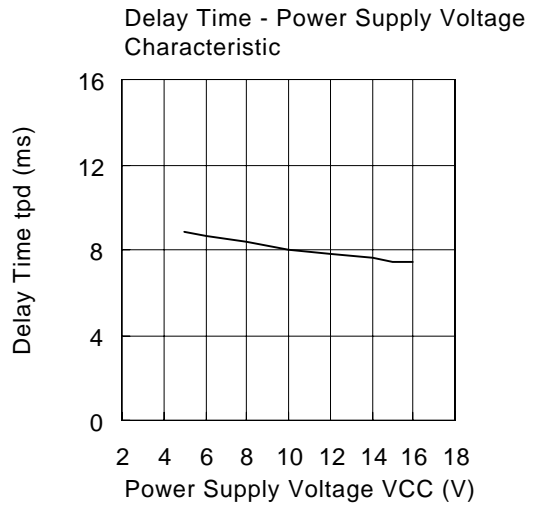
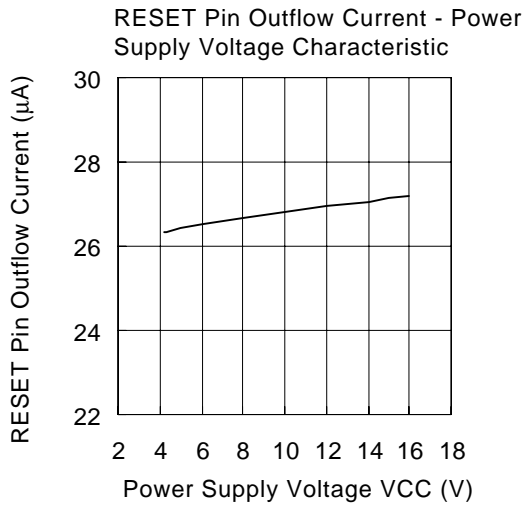


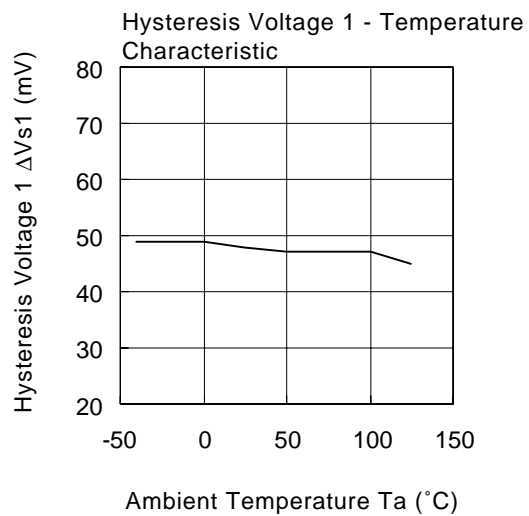
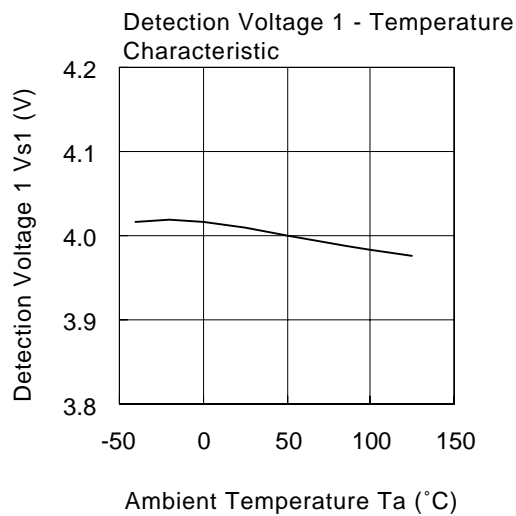
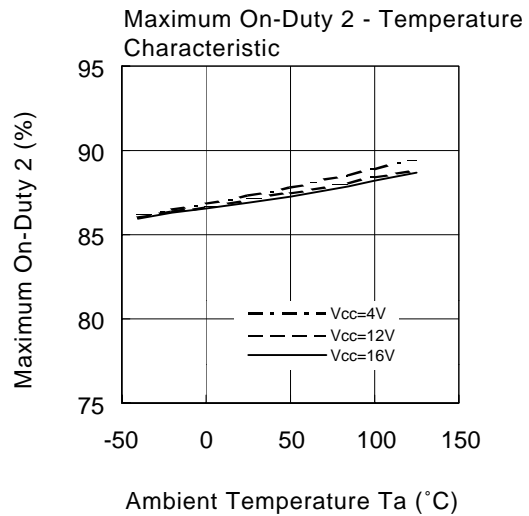
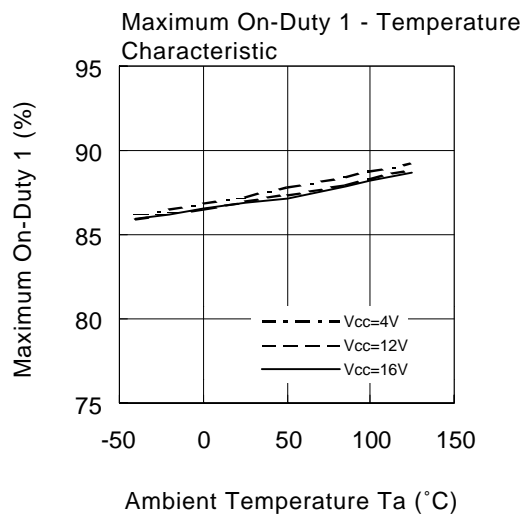
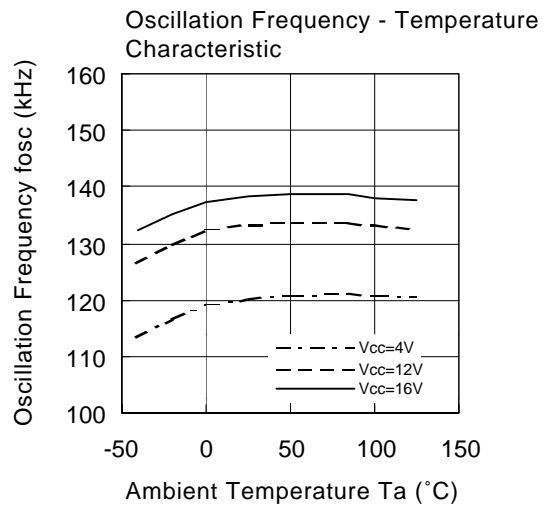
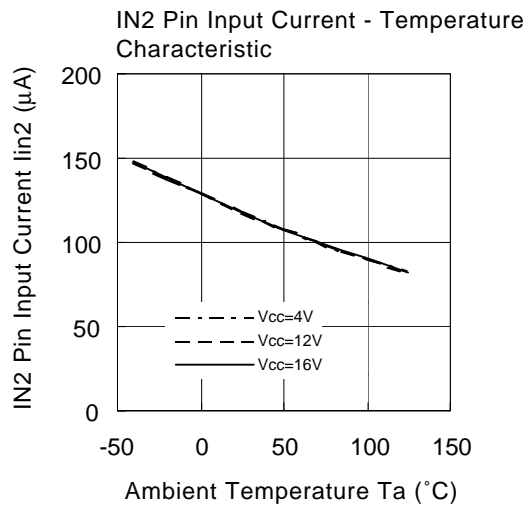
Hysteresis Voltage 2 - Power Supply Voltage Characteristic

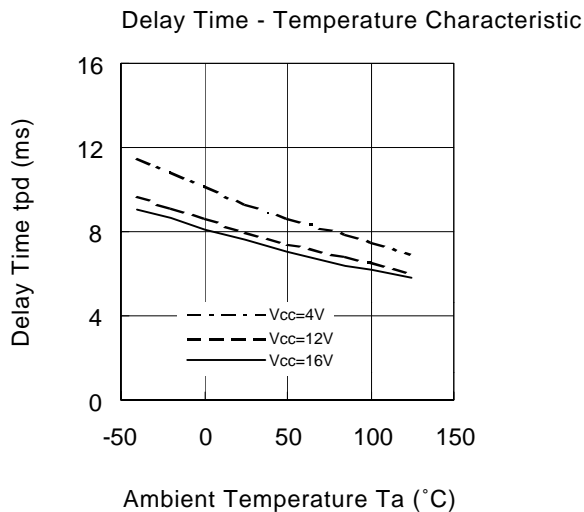
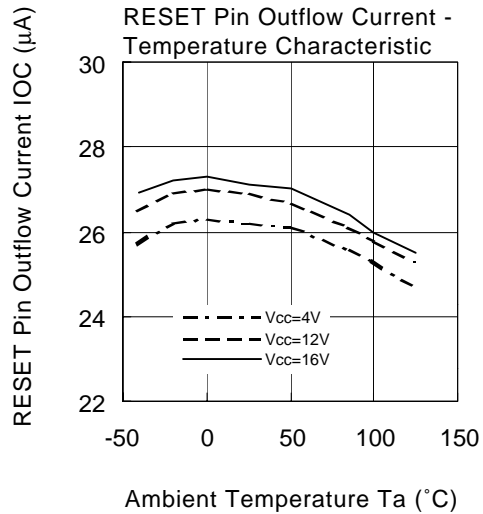
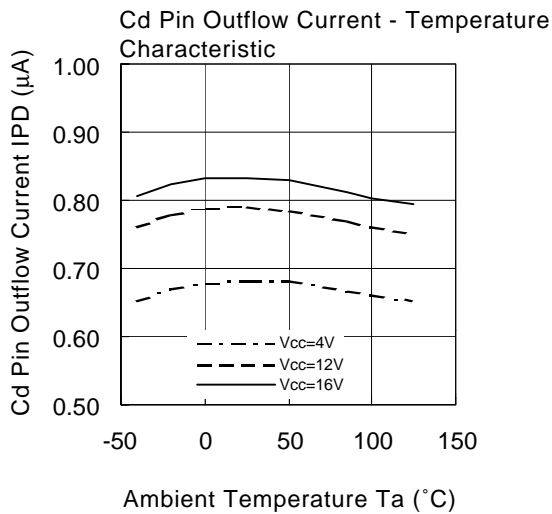
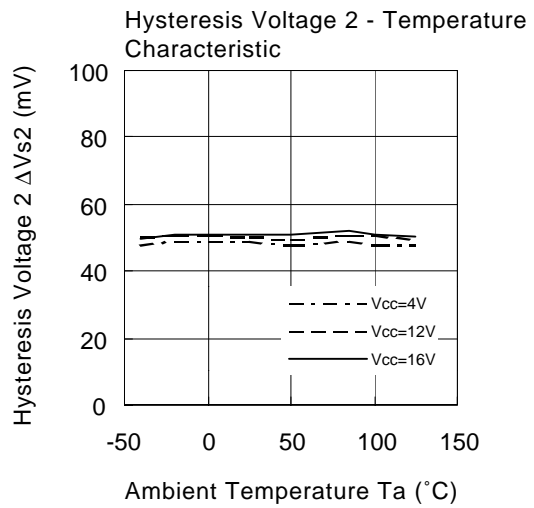
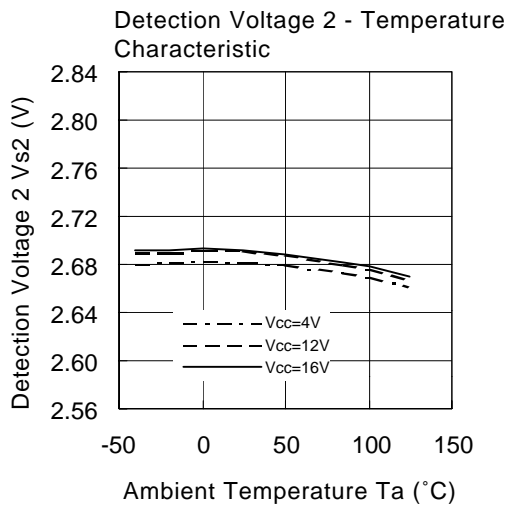


Cd Pin Outflow Current - Power Supply Voltage Characteristic





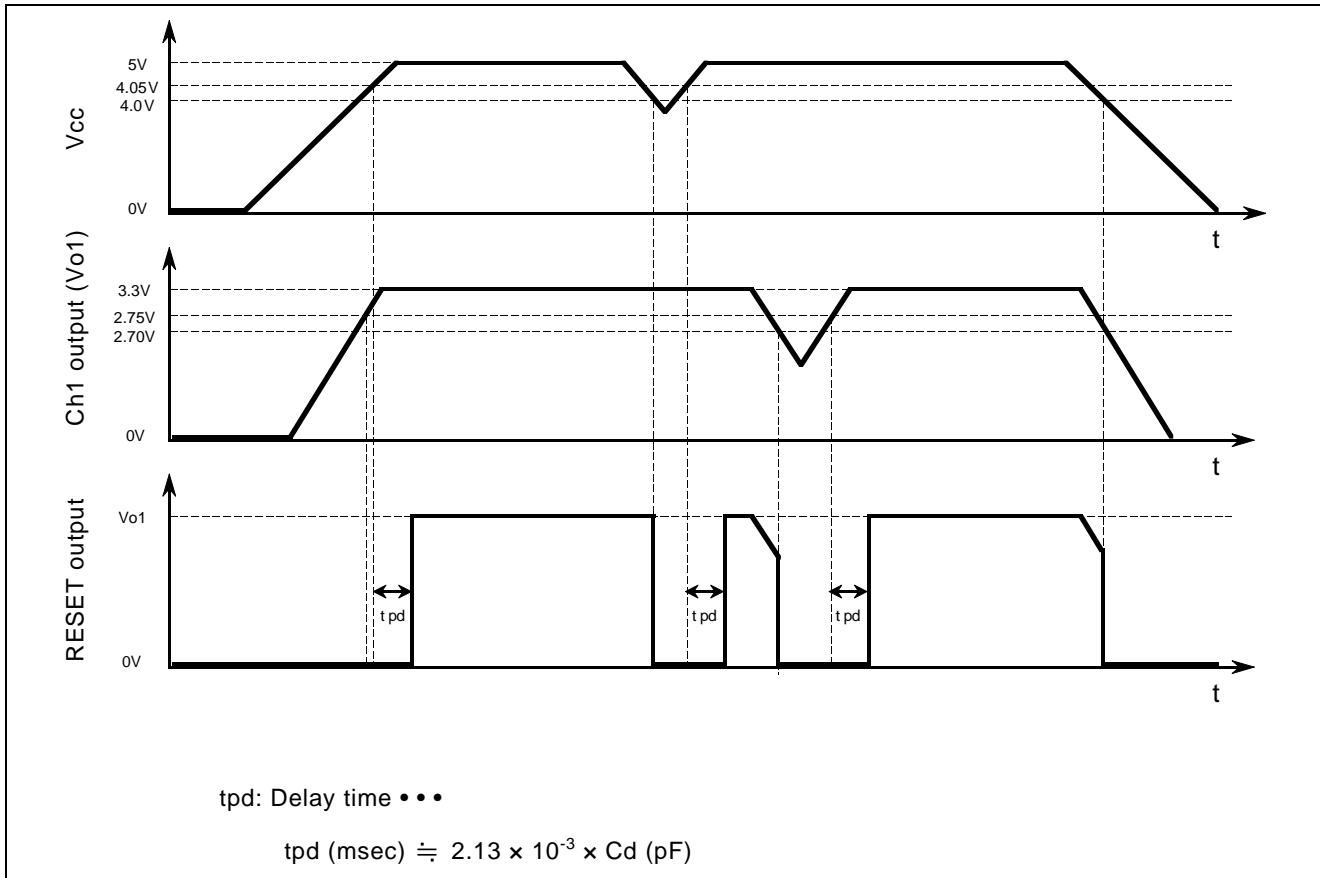




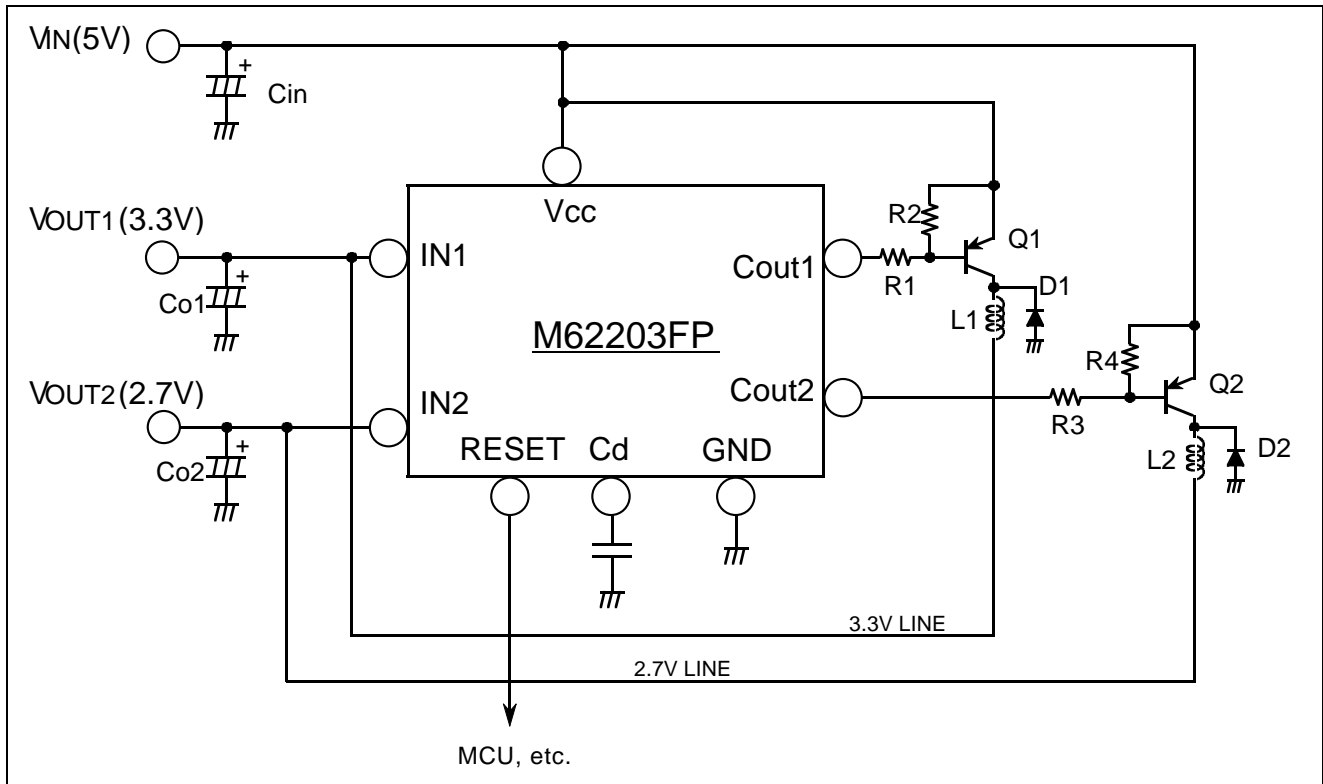


## Reset Circuit Operation

Reset Circuit Block Timing Chart



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



Constant Determination Equations

Constant	Calculation Equation
$\frac{T_{ON}}{T_{OFF}}$	$\frac{V_O + V_F}{V_{IN} - V_{CE(sat)} - V_O}$
$(T_{ON} + T_{OFF})_{MAX}$	$\frac{1}{f_{osc}}$ fosc: 110KHz (Vcc=5V)
$T_{OFF(MIN)}$	$(T_{ON} + T_{OFF}) / (1 + \frac{T_{ON}}{T_{OFF}})$
$T_{ON(MAX)}$	$\frac{1}{f_{osc}} - T_{OFF}$
$L(MIN)$	$\frac{(V_{IN} - V_{CE(sat)} - V_O) \times T_{ON(MAX)}}{\Delta I_o}$
$I_{pk}$	$I_o + \frac{1}{2} \Delta I_o$

- Notes:
- VF: Forward voltage of external diode
  - V<sub>sat</sub>: Output saturation voltage of external transistor
  - ΔI<sub>o</sub>: 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 I<sub>pk</sub> or above.

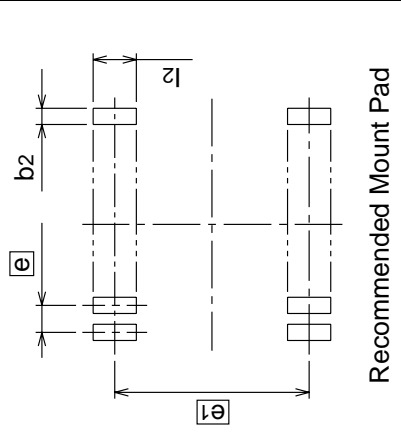
Package Dimensions

**8P2S-A**

(MMP)

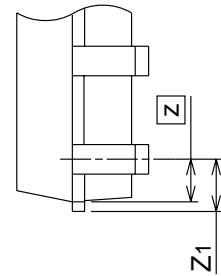
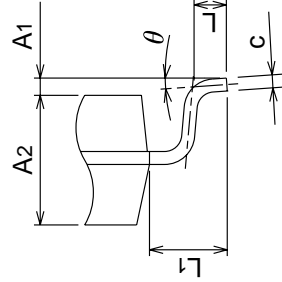
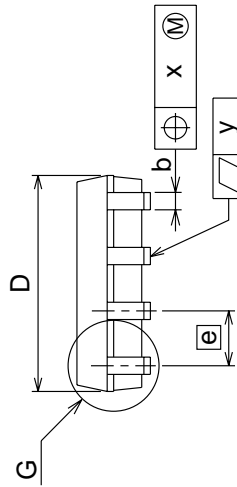
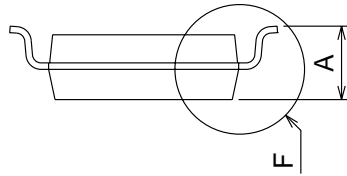
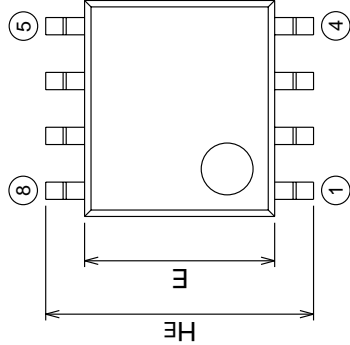
EIAJ Package Code SOP8-P-225-1.27	JEDEC Code -	Weight(g) 0.07	Lead Material Cu Alloy
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**Plastic 8pin 225mil SOP**



Recommended Mount Pad

Symbol	Dimension in Millimeters		
	Min	Nom	Max
A	-	-	1.9
A1	0.05	-	-
A2	-	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	-
HE	5.9	6.2	6.5
L	0.2	0.4	0.6
L1	-	0.9	-
Z	-	0.595	-
Z1	-	-	0.745
x	-	-	0.25
y	-	-	0.1
$\theta$	0°	-	10°
b2	-	0.76	-
e1	-	5.72	-
l2	1.27	-	-



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