rev 1.3

Low Power, 5V/3.3V, µP Reset, Active LOW, Open-Drain Output

General Description

The ASM1233D-L/1233D/1233M are voltage supervisors with low-power, 5/3.3V µP Reset, with an active LOW, open-drain output. Maximum supply current over temperature is 15µA for 3.3V devices and 20µA for 5V devices.

The ASM1233D-L/1233D/1233M generates an active LOW reset signal whenever the monitored supply is out of tolerance. A precision reference and comparator circuit monitors power supply (V_{CC}) level. The tolerance are 5%,10% and 15%. When an out-of-tolerance condition is detected, an internal power-fail signal is generated which forces an active LOW reset signal. After V_{CC} returns to an in-tolerance condition, the reset signal remains active for 350ms to allow the power supply and system microprocessor to stabilize.

The ASM1233D-L/1233D/1233M is designed with an open-drain output stage and operates over the extended industrial temperature range. These devices are available in compact SOT-223, SO-8 and TO-92 packages.

Other low power products in this family include ASM1810/11/12/15/16/17.

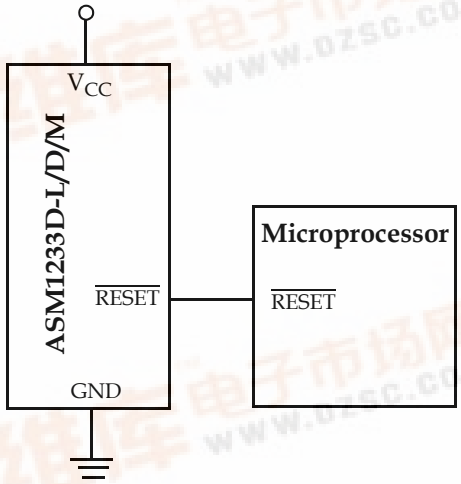
Key Features

- Low Supply Current
  - 15µA maximum (<=3.6V), 20µA maximum (5.5V)
- Automatically restarts a microprocessor after power failure
- 350ms reset delay after V_{CC} returns to an in-tolerance condition
- Active LOW power-up reset, 5kΩ internal pull-up
- Precision temperature-compensated voltage reference and comparator
- Eliminates external components
- Low-cost SOT-223/SO-8/TO-92 packages
- Operating temperature: -40°C to +85°C

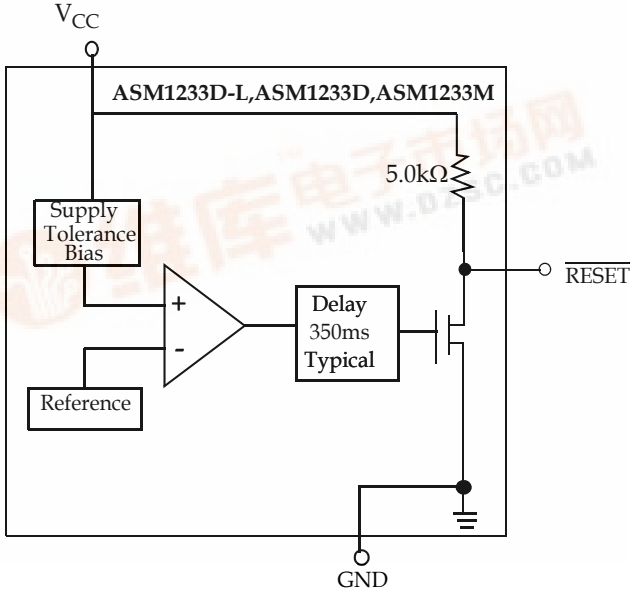
Applications

- Set-top boxes
- Cellular phones
- PDAs
- Energy management systems
- Embedded control systems
- Printers
- Single board computers

Typical Operating Circuit

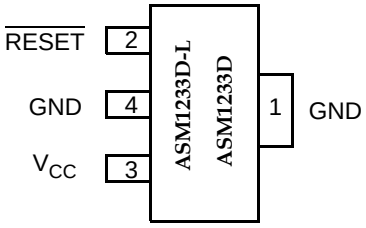


Block Diagram

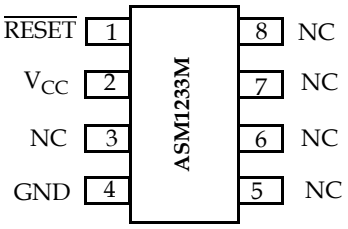


Pin Configuration

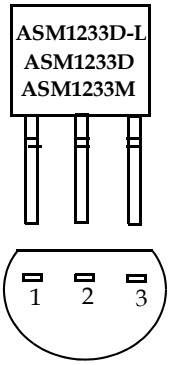
SOT-223



SO-8



TO-92



Pin Description

Pin#				Pin Name	Description
TO-92 ASM1233D-L ASM1233D	TO-92 ASM1233M	SO-8	SOT-223		
1	3	4	1,4	GND	Ground.
2	1	1	2	$\overline{\text{RESET}}$	Active LOW reset output.
3	2	2	3	V_{CC}	Power supply input.
-	-	3,5,6,7&8	-	NC	No connection

Application Information

Operation - Power Monitor

The ASM1233D-L/1233D/1233M detects out-of-tolerance power supply conditions. It resets a processor during power-up, power-down and generates a reset to the system processor when the monitored power supply voltage is below the reset threshold. When an out-of-tolerance V_{CC} voltage is detected, the $\overline{RESET}$ signal is asserted. On power-up, $\overline{RESET}$ is kept active (LOW) for approximately 350ms after the power supply voltage has reached the selected tolerance. This allows the power supply and microprocessor to stabilize before $\overline{RESET}$ is released.

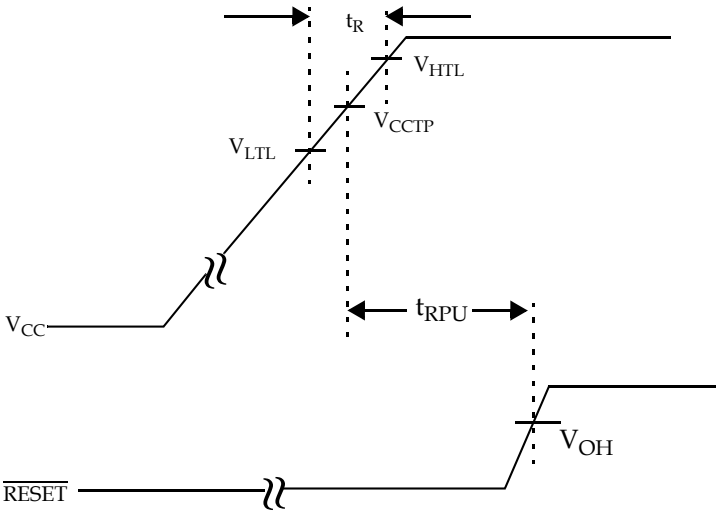


Figure 1: Timing Diagram: Power-Up

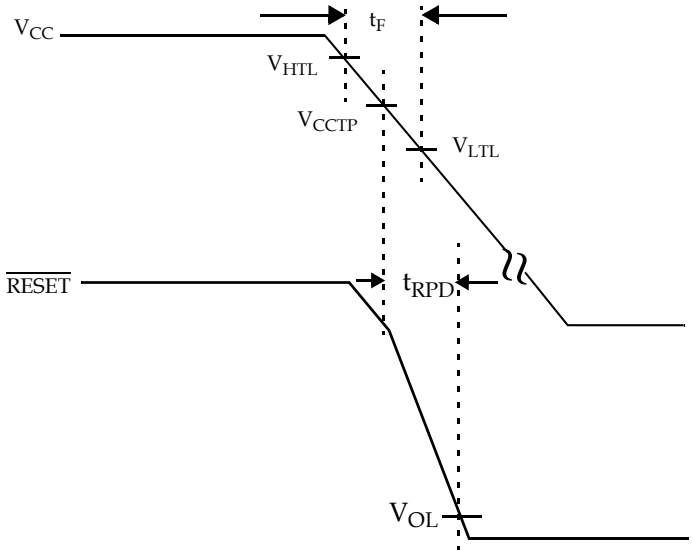


Figure 2: Timing Diagram: Power-Down

Absolute Maximum Ratings

Parameter	Min	Max	Unit
Voltage on V_{CC}	-0.5	7	V
Voltage on $\overline{RESET}$	-0.5	V_{CC} + 0.5	V
Operating Temperature Range	-40	85	°C
Soldering Temperature (for 10 sec)		260	°C
Storage Temperature	-55	125	°C
ESD rating HBM MM		 2 200	 KV V
NOTE: These are stress ratings only and functional use is not implied. Exposure to absolute maximum ratings for prolonged periods of time may affect device reliability.			

Electrical Characteristics

Unless otherwise noted, V_{CC} = 5V±10% and specifications are over the operating temperature range of -40°C to +85°C.

All voltages are referenced to ground.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	V_{CC}		1.2		5.5	V
Output Voltage	V_{OL}	$\overline{\text{RESET}}$ asserted	-	-	0.4	V
	V_{OH}	I_{OUT} < 500 µA	V_{CC}-0.5V	V_{CC}-0.1V		
Output Current	I_{OL}	Output = 0.4V	8			mA
Operating Current	I_{CC}	V_{CC} < 5.5V, $\overline{\text{RESET}}$ output open		8	20	µA
		V_{CC} < =3.6V, $\overline{\text{RESET}}$ output open		6	15	
V_{CC} Trip Point	V_{CCTP}	ASM1233D-LZ-5	2.98	3.06	3.15	V
		ASM1233D-LZ-10	2.8	2.88	2.97	
		ASM1233D-LZ-15	2.64	2.72	2.8	
		ASM1233DZ-5	4.5	4.625	4.74	
		ASM1233DZ-10	4.25	4.375	4.49	
		ASM1233DZ-15	4.0	4.125	4.24	
		ASM1233M-5	4.25	4.375	4.49	
		ASM1233M-55	4.5	4.625	4.75	
		ASM1233M-3	2.64	2.72	2.8	
Voltage High Trip Level	V_{HTL}	ASM1233D, ASM1233MS-5, ASM1233MS-55			4.75	V
		ASM1233MS-3			3.14	
		ASM1233D-L			3.06	
Voltage Low Trip Level	V_{LTL}	ASM1233D, ASM1233MS-5, ASM1233MS-55			4.00	V
		ASM1233MS-3			2.48	
		ASM1233D-L			2.3	
Internal Pull-up Resistor	R_P		3.5	5.0	7.5	kΩ
Output Capacitance	C_{OUT}				10	pF
V_{CC} Detect to $\overline{\text{RESET}}$ Low	t_{RPD}			2	10	µs
V_{CC} Detect to $\overline{\text{RESET}}$ High	t_{RPU}	ASM1233D-L, ASM1233M	200	350	500	ms
		ASM1233D	250	350	450	
V_{CC} Slew Rate (V_{HTL} - V_{LTL})	t_F		300			µs
V_{CC} Slew Rate (V_{LTL} - V_{HTL})	t_R		0			ns
Note: A 1kΩ resistor maybe required in some applications for proper operation of the microprocessor reset control circuit.						

Family Selection Guide

Part #	RESET Voltage (V)	RESET Time (ms)	Output Stage	RESET Polarity
ASM1810	4.620, 4.370, 4.120	150	Push-Pull	LOW
ASM1811	4.620, 4.350, 4.130	150	Open-Drain	LOW
ASM1812	4.620, 4.350, 4.130	150	Push-Pull	HIGH
ASM1815	3.060, 2.880, 2.550	150	Push-Pull	LOW
ASM1816	3.060, 2.880, 2.550	150	Open-Drain	LOW
ASM1817	3.060, 2.880, 2.550	150	Push-Pull	HIGH
ASM1233D	4.625, 4.375, 4.125	350	Open-Drain	LOW
ASM1233M	4.625, 4.375, 2.720	350	Open-Drain	LOW
ASM1233D-L	3.06, 2.880, 2.720	350	Open-Drain	LOW

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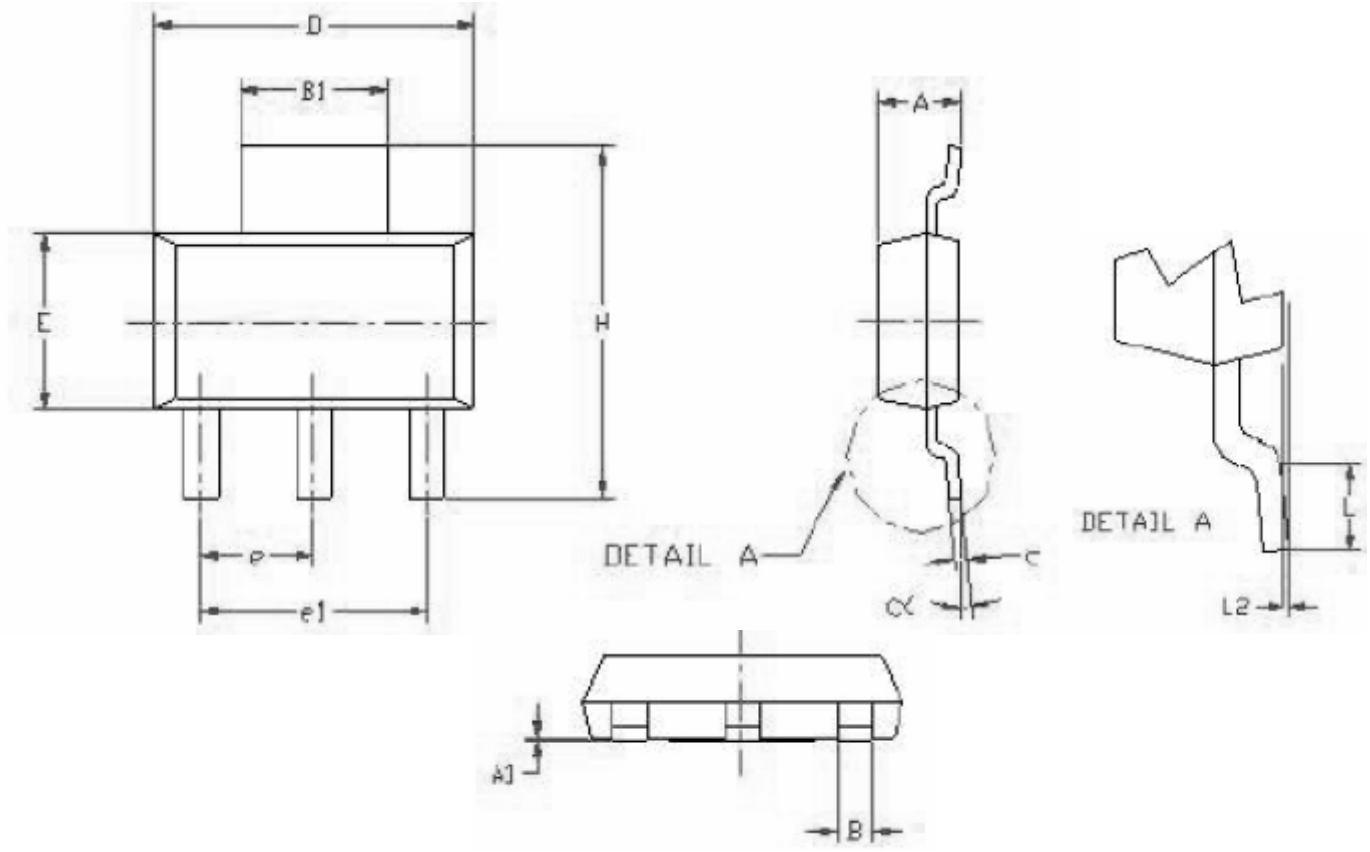
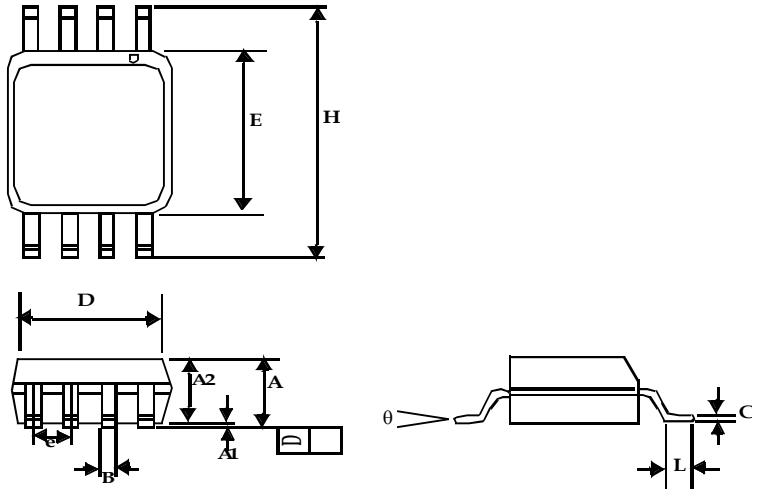
Package Information

SOT-223



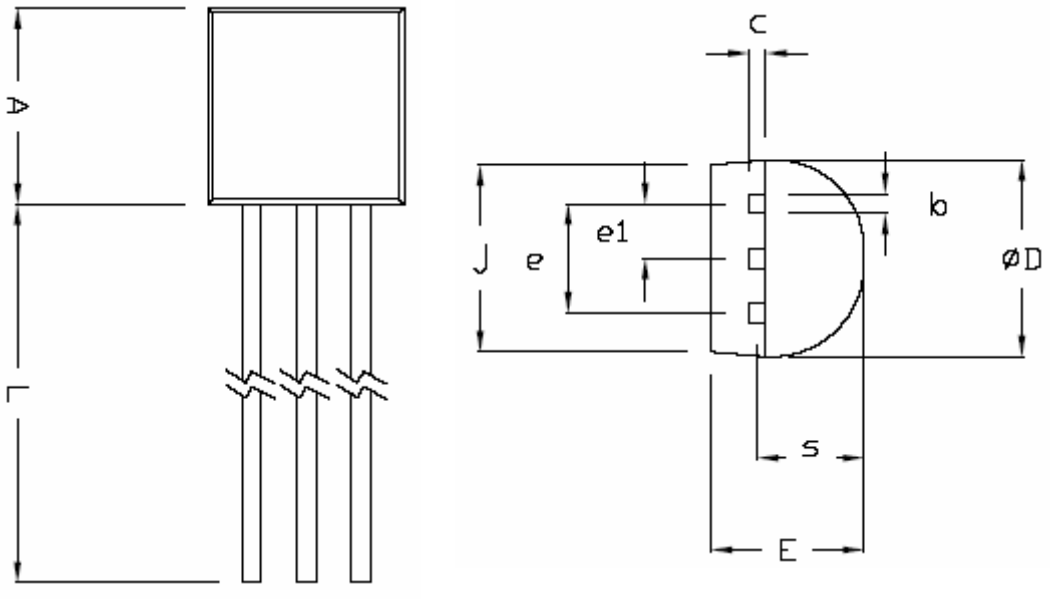
Symbol	Dimensions in Inches		Dimensions in millimeters	
	Min	Max	Min	Max
A	0.061	0.071	1.55	1.80
A1	0.0008	0.004	0.02	0.10
B	0.024	0.031	0.60	0.80
B1	0.114	0.122	2.90	3.10
C	0.009	0.013	0.24	0.32
D	0.248	0.264	6.30	6.70
E	0.130	0.146	3.30	3.70
e	0.090BSC		2.30 BSC	
e1	0.181 BSC		4.60 BSC	
H	0.264	0.287	6.70	7.30
L	0.036 MIN		0.91 MIN	
L2	0.0024 MIN		0.06 BSC	
α	0°	6°	0°	6°

Plastic SO-8 (8-Pin)



	Dimensions in Inches		Dimensions in Millimeters	
	Min	Max	Min	Max
Plastic SO-8 (8-Pin)				
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
A2	0.049	0.059	1.25	1.50
B	0.012	0.020	0.31	0.51
C	0.007	0.010	0.18	0.25
D	0.193 BSC		4.90 BSC	
E	0.154 BSC		3.91 BSC	
e	0.050 BSC		1.27 BSC	
H	0.236 BSC		6.00 BSC	
L	0.016	0.050	0.41	1.27
θ	0°	8°	0°	8°

To-92 (3-Pin)



	Dimensions in Inches		Dimensions in Millimeters	
	Min	Max	Min	Max
TO-92				
A	0.175	0.185	4.445	4.699
b	0.016	0.020	0.406	0.508
C	0.014	0.016	0.356	0.406
ϕD	0.175	0.185	4.445	4.699
E	0.138	0.144	3.505	3.658
e	0.098	0.102	2.489	2.591
e1	0.045	0.055	1.143	1.397
j	0.168	0.174	4.269	4.420
L	0.500	0.585	12.7	14.86
s	0.095	0.099	2.413	2.515

Ordering Information

Part Number**	RESET Output Voltage	RESET Tolerance	RESET Time	Open Drain Output Stage*	RESET Polarity	Package	Package Marking
TIN - LEAD DEVICES							
ASM1233D-L-5	3.06	5%	350 ms	◆	LOW	3L TO-92	ASM1233D-L-5
ASM1233D-L-10	2.88	10%	350 ms	◆	LOW	3L TO-92	ASM1233D-L-10
ASM1233D-L-15	2.72	15%	350 ms	◆	LOW	3L TO-92	ASM1233D-L-15
ASM1233D-LZ-5	3.06	5%	350 ms	◆	LOW	4L SOT-223	RVLL
ASM1233D-LZ-10	2.88	10%	350 ms	◆	LOW	4L SOT-223	RWLL
ASM1233D-LZ-15	2.72	15%	350 ms	◆	LOW	4L SOT-223	RXLL
ASM1233D-5	4.625	5%	350 ms	◆	LOW	3L TO-92	ASM1233D-5
ASM1233D-10	4.375	10%	350 ms	◆	LOW	3L TO-92	ASM1233D-10
ASM1233D-15	4.125	15%	350 ms	◆	LOW	3L TO-92	ASM1233D-15
ASM1233DZ-5	4.625	5%	350 ms	◆	LOW	4L SOT-223	RSLL
ASM1233DZ-10	4.375	10%	350 ms	◆	LOW	4L SOT-223	RTLL
ASM1233DZ-15	4.125	15%	350 ms	◆	LOW	4L SOT-223	RULL
ASM1233M-55	4.625	5%	350 ms	◆	LOW	3L TO-92	ASM1233M-55
ASM1233M-5	4.375	10%	350 ms	◆	LOW	3L TO-92	ASM1233M-5
ASM1233M-3	2.72	15%	350 ms	◆	LOW	3L TO-92	ASM1233M-3
ASM1233MS-55	4.625	5%	350 ms	◆	LOW	8L SOIC	ASM1233MS-55
ASM1233MS-5	4.38	10%	350 ms	◆	LOW	8L SOIC	ASM1233MS-5
ASM1233MS-3	2.72	15%	350 ms	◆	LOW	8L SOIC	ASM1233MS-3
LEAD FREE DEVICES							
ASM1233D-L-5F	3.06	5%	350 ms	◆	LOW	3L TO-92	ASM1233D-L-5F
ASM1233D-L-10F	2.88	10%	350 ms	◆	LOW	3L TO-92	ASM1233D-L-10F
ASM1233D-L-15F	2.72	15%	350 ms	◆	LOW	3L TO-92	ASM1233D-L-15F
ASM1233D-LZ-5F	3.06	5%	350 ms	◆	LOW	4L SOT-223	KVLL
ASM1233D-LZ-10F	2.88	10%	350 ms	◆	LOW	4L SOT-223	KWLL
ASM1233D-LZ-15F	2.72	15%	350 ms	◆	LOW	4L SOT-223	KXLL
ASM1233D-5F	4.625	5%	350 ms	◆	LOW	3L TO-92	ASM1233D-5F
ASM1233D-10F	4.375	10%	350 ms	◆	LOW	3L TO-92	ASM1233D-10F
ASM1233D-15F	4.125	15%	350 ms	◆	LOW	3L TO-92	ASM1233D-15F
ASM1233DZ-5F	4.625	5%	350 ms	◆	LOW	4L SOT-223	KSLL
ASM1233DZ-10F	4.375	10%	350 ms	◆	LOW	4L SOT-223	KTLL
ASM1233DZ-15F	4.125	15%	350 ms	◆	LOW	4L SOT-223	KULL
ASM1233M-5F	4.375	5%	350 ms	◆	LOW	3L TO-92	ASM1233M-5F
ASM1233M-55F	4.625	10%	350 ms	◆	LOW	3L TO-92	ASM1233M-55F
ASM1233M-3F	2.72	15%	350 ms	◆	LOW	3L TO-92	ASM1233M-3F
ASM1233MS-5F	4.38	5%	350 ms	◆	LOW	8L SOIC	ASM1233MS-5F
ASM1233MS-55F	4.625	10%	350 ms	◆	LOW	8L SOIC	ASM1233MS-55F
ASM1233MS-3F	2.72	15%	350 ms	◆	LOW	8L SOIC	ASM1233MS-3F

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Part Number: ASM1233D-L/D/M
Document Version: 1.3