IC for System Reset (battery backup)
Monolithic IC MM1134

Outline

This IC protects SRAM data by setting SRAM in backup mode (setting the CE pin of SRAM low and $\overline{CE}$ pin high with CS signal) when supply voltage falls below a predetermined voltage (detection voltage 3.5V, 4.2V typ.). Then, when supply voltage is getting lower, the main power supply is switched to a battery (switching voltage 3.3V typ.) to enter backup mode with the battery. Meanwhile, when the power supply rises, first it switches to the main power supply (switching voltage 3.3V typ.) from the battey backup mode, then switches SRAM from backup mode to normal mode (by setting the CE pin of SRAM high and $\overline{CE}$ pin low). Data damage can be reliably prevented by this signal processing.

Features

1. Power supply switching circuit (switching between the main power supply and a battery)
2. CS control for SRAM
   Normal mode: Enables access to SRAM
   Backup mode: Disables access to SRAM, low current consumption mode
3. With CS signal gate circuit

Characteristics

1. Battery back-up		
1. Low IC current consumption (loss current)		0.3µA typ.
2. Drop voltage inside IC (input/output voltage difference)	I_O=100µA	0.3V typ.
3. Reverse current (reverse leak current)		0.1µA max.
2. Normal operation		
1. Drop voltage inside IC (input/output voltage difference)	I_O=50µA	0.2V typ.
2. Output voltage V_{CC}=5V	I_O=50mA	4.8V typ.
3. Battery-V_{CC} switching voltage		3.3V typ.
4. Detection voltage (CS, $\overline{CS}$, reset output)	A : 3.5V typ.	
	B : 4.2V typ.	

Package

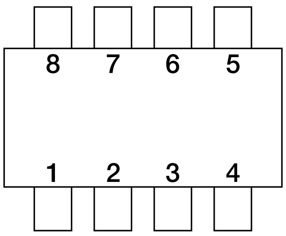
SOP-8C (MM1134 □F)

* The box represents a rank of detection voltage.

Applications

1. Memory cards (SRAM cards)
2. PCs, word processors
3. Fax machines, photocopiers, other OA equipment
4. Sequence controllers, other FA equipment
5. SRAM-mounted devices such as video game devices

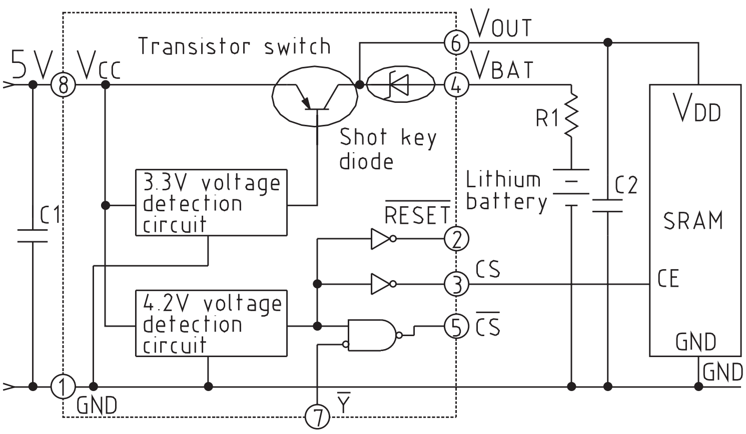
Pin Assignment



SOP-8C
(TOP VIEW)

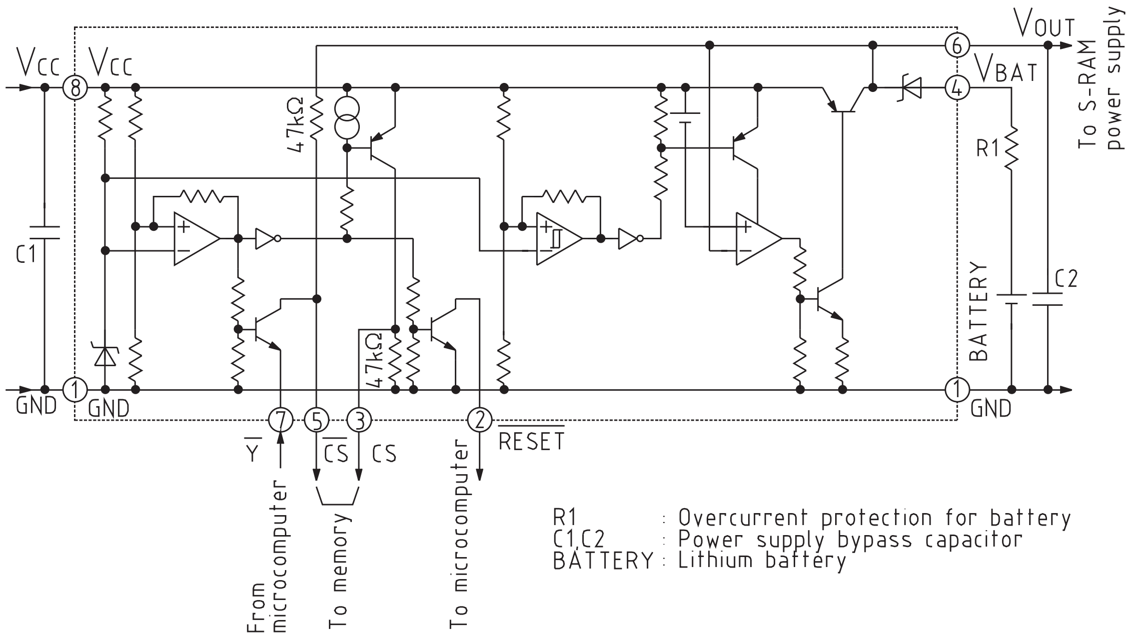
Pin no.	Pin name
1	GND
2	$\overline{RESET}$
3	CS
4	V_{BATT}
5	$\overline{CS}$
6	V_{OUT}
7	$\overline{Y}$
8	V_{CC}

Block Diagram



Back-up IC inside dotted lines
C1,C2: Power supply bypass capacitor
R1 : Lithium battery protection resistor

Equivalent Circuit Diagram



Absolute Maximum Ratings (Ta=25℃)

Item	Symbol	Rating	Units
Storage temperature	TSTG	–40~+125	℃
Operating temperature	TOPR	–20~+75	℃
Power supply voltage	VCC max.	–0.3~7	V
Operating voltage	VCCOP	–0.3~7	V
Allowable loss	Pd	300	mW
Output current	Io1	80	mA
Output current	Io2	200	µA

Note : Io1 expresses VCC output current value, and Io2 expresses VBATT output current value.

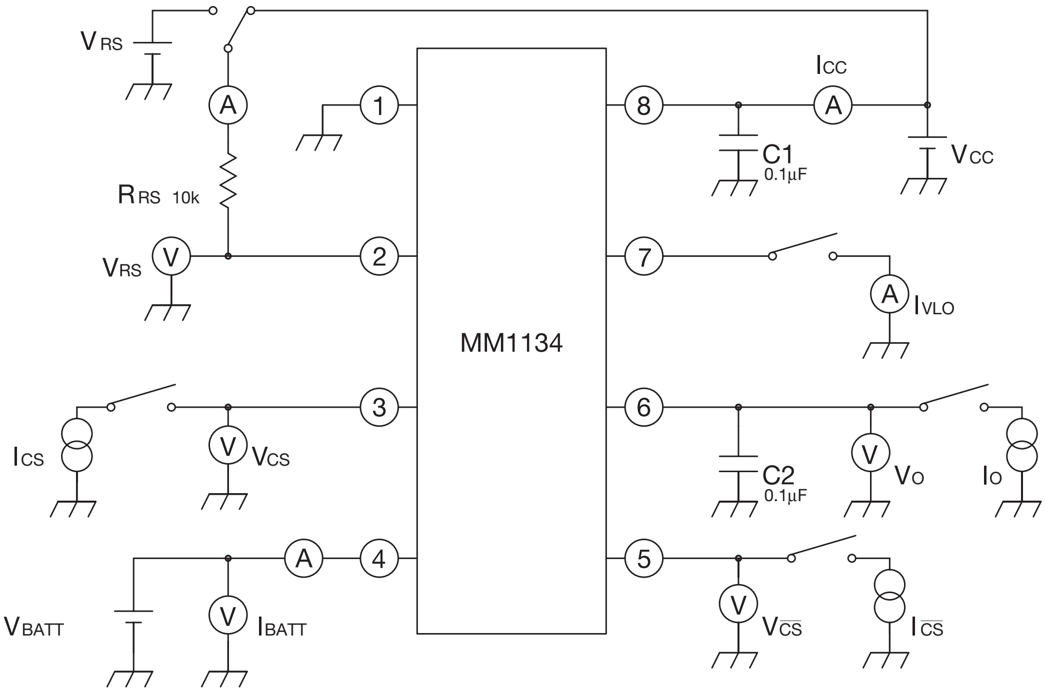
Electrical Characteristics

Typical model: MM1134B(Except where noted otherwise, Ta=25°C, V_{CC}=V_{RS}=5V, R_{RS}=10kΩ)

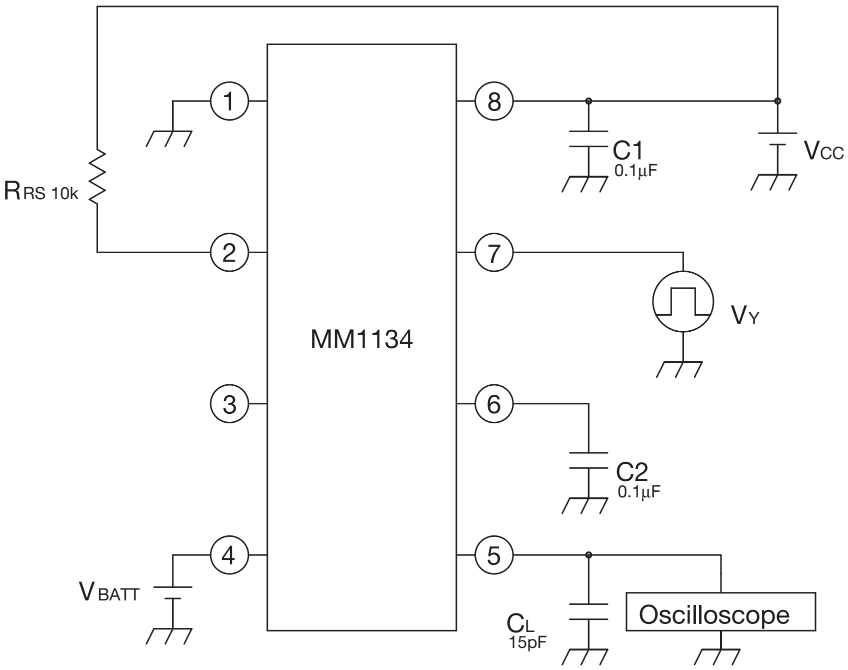
Item	Symbol	Measuring circuit	Measurement conditions	Min.	Typ.	Max.	Units
Consumption current	I_{CC}	1	V_{CC}=5V, V_{BATT}=3V, I_{O1}=0mA		1.4	2.2	mA
I/O voltage difference 1	V_{SAT1}	1	V_{CC}=5V, V_{BATT}=3V, I_{O1}=1mA		0.03	0.05	V
Output voltage 1	V_{O1}	1	V_{CC}=5V, V_{BATT}=3V, I_{O1}=1mA	4.95	4.97		V
Output voltage 2	V_{O2}	1	V_{CC}=5V, V_{BATT}=3V, I_{O1}=15mA	4.75	4.90		V
Output voltage 3	V_{O3}	1	V_{CC}=5V, V_{BATT}=3V, I_{O1}=50mA	4.70	4.80		V
Detection voltage	V_S	1	V_{CC}=H→L	4.00	4.20	4.40	V
Hysteresis voltage	⊿V_S	1	V_{CC}=L→H	50	100	200	mV
Reset output voltage L	V_{RSL}	1	V_{CC}=3.7V		0.2	0.4	V
Reset leakage current H	I_{RSH}	1	V_{CC}=5V, V_{RS}=7.0V		±0.01	±0.1	μA
Reset operation limit voltage	V_{OPL}	1	V_{RSL}≤0.4V, V_{CC}=H→L		0.8	1.2	V
CS output voltage L	V_{CSL}	1	V_{CC}=3.7V, V_{BATT}=3V, I_{CS}=1μA			0.1	V
CS output voltage H	V_{CSH}	1	V_{CC}=5V, V_{BATT}=3V, I_{CS}=–1μA	4.90			V
$\overline{CS}$ output voltage L	$V_{\overline{CS}L}$	1	V_{CC}=5V, V_{BATT}=3V, $I_{\overline{CS}}$=1μA, $V_{\overline{Y}}$=0V			0.2	V
$\overline{CS}$ output voltage H	$V_{\overline{CS}H}$	1	V_{CC}=3.7V, V_{BATT}=3V, $I_{\overline{CS}}$=–1μA, $V_{\overline{Y}}$=0V V_{CC}=5V, V_{BATT}=3V, $I_{\overline{CS}}$=–1μA, $V_{\overline{Y}}$=5V	V_O–0.1			V
Detection voltage temperature characteristic	V_S/⊿T	1				±0.05	%/℃
Power supply switching voltage	V_B	1	V_{CC}=H→L	3.15	3.30	3.45	V
Hysteresis voltage	⊿V_B	1	V_{CC}=L→H	50	100	200	mV
Switching voltage temperature characteristic	V_B/⊿T	1				±0.05	%/℃
Loss current	I_{BL}	1	V_{CC}=0V, V_{BATT}=3V, I_{O2}=0μA		0.3	0.5	μA
I/O voltage difference 2	Vsat2	1	V_{CC}=0V, V_{BATT}=3V, I_{O2}=1μA		0.2	0.3	V
Output voltage 4	V_{O4}	1	V_{CC}=0V, V_{BATT}=3V, I_{O2}=1μA	2.7	2.8		V
Output voltage 5	V_{O5}	1	V_{CC}=0V, V_{BATT}=3V, I_{O2}=100μA	2.6	2.7		V
Reverse current	I_{OREV}	1	V_{CC}=5V, V_{BATT}=0V			0.1	μA
$\overline{Y}$ pin Lo level current	$I_{\overline{Y}LO}$	1	V_{CC}=5V, V_{BATT}=3V, $V_{\overline{Y}}$=0V		150	400	μA
$\overline{Y}$ pin Pin transmission delay time	t_{pLH}	2	V_Y=L→H, C_L=15pF *		8	20	ns
	t_{pHL}	2	V_Y=H→L, C_L=15pF *		8	20	ns
Reference voltage (typical)	V_{REF}				1.25		V

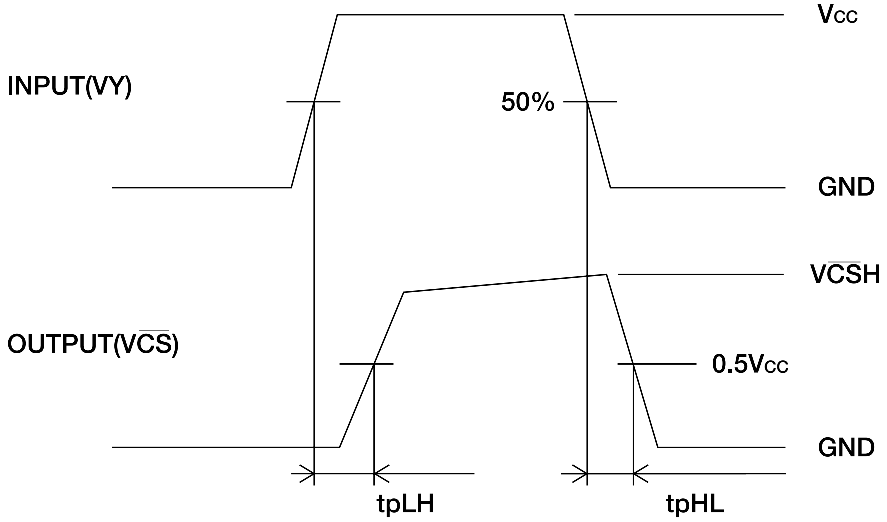
Note : When input pulse rise and fall time is less than 6Nsec.

Measuring circuit 1

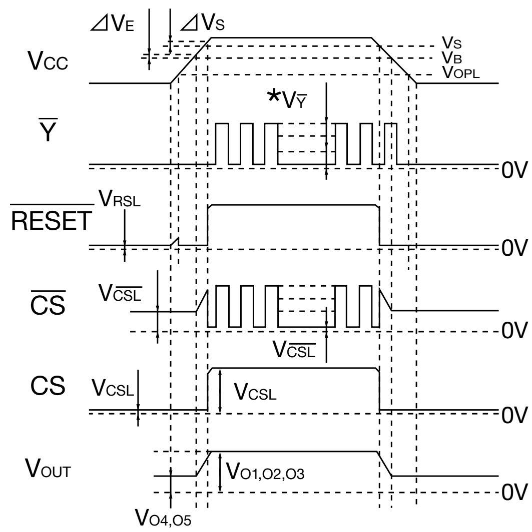


Measuring circuit 2





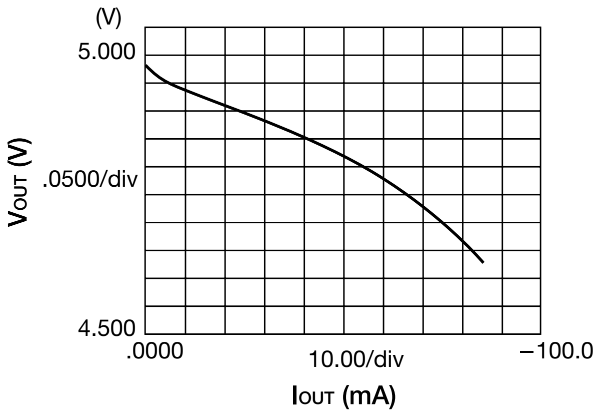
Timing Chart



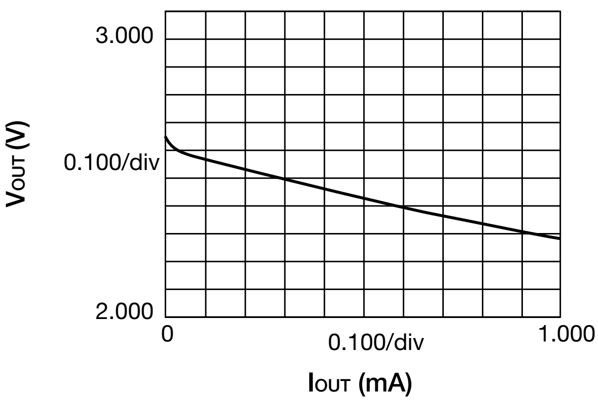
* Use $\overline{Y}$ pin input voltage at less than 5V when Vcc ≦ Vs.

Characteristics

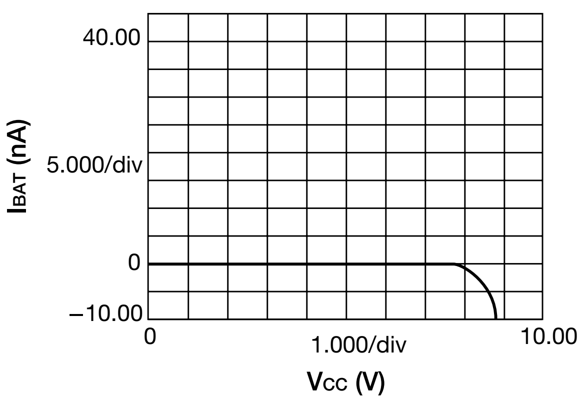
VOUT-IOUT (VCC=5.0V)



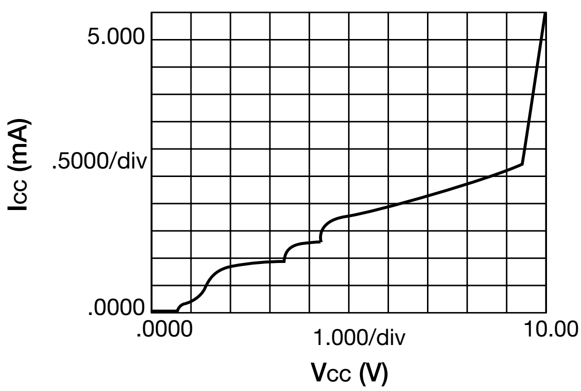
VOUT-IOUT (VBAT=3.0V)



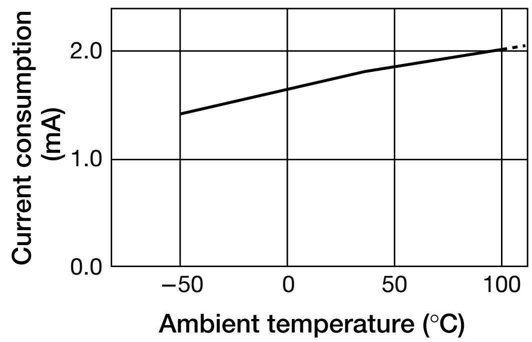
VCC-IBAT



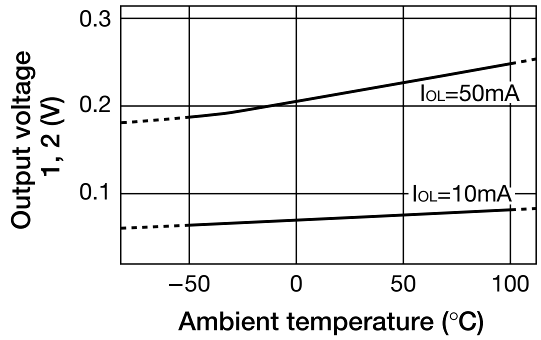
VCC-ICC



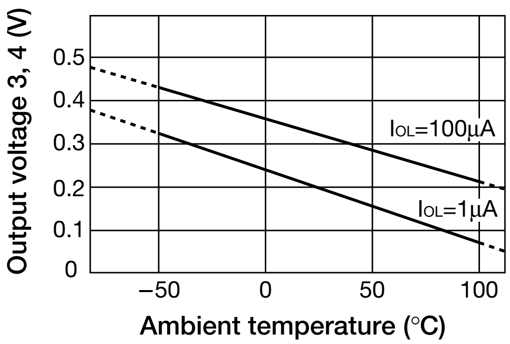
Current consumption-Temperature characteristics



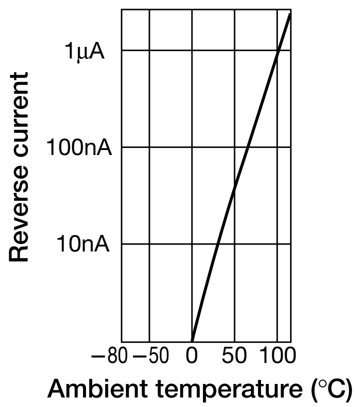
Output voltage 1, 2-Temperature characteristics



Output voltage 3, 4-Temperature



Reverse current-Temperature



Loss current-Temperature