ROHM

◇ **STRUCTURE** Silicon Monolithic Integrated Circuit

◇ **PRODUCT** I²C BUS Serial EEPROMs

◇ **SERIES** SIGNATURE SERIES

◇ **FAMILY** BR24C☐☐ family

◇ **TYPE** Supply voltage 1.8V～5.5V/Opreating temperature −40℃～+85℃type

◇ **PART NUMBER** BR24C☐☐-R☐☐6TP

PART NUMBER	PACKAGE	DENSITY
BR24C01-RMN6TP	SO8 narrow	1Kbit
BR24C02-RMN6TP		2Kbit
BR24C04-RMN6TP		4Kbit
BR24C08-RMN6TP		8Kbit
BR24C16-RMN6TP		16Kbit
BR24C01-RDW6TP	TSSOP8	1Kbit
BR24C02-RDW6TP		2Kbit
BR24C04-RDW6TP		4Kbit
BR24C08-RDW6TP		8Kbit
BR24C16-RDW6TP		16Kbit
BR24C01-RDS6TP	TSSOP8 $3 \times 3mm^2$	1Kbit
BR24C02-RDS6TP		2Kbit
BR24C04-RDS6TP		4Kbit
BR24C08-RDS6TP		8Kbit
BR24C16-RDS6TP		16Kbit

◇ **FEATURES**

Two wire serial interface
Endurance : 1,000,000 erase/write cycles
Data retention : 40years
Intial Data FFh in all address

◇ **ABSOLUTE MAXIMUM RATING**

Symbol	Parameter	Min	Max	Unit
Tstg	Storage Temperature	−65	125	℃
Vio	Terminal Voltage	−0.3	Vcc+0.3	V
Vcc	Supply Voltage	−0.3	6.5	V

◇ **POWER DISSIPATION (Ta=25℃)**

PACKAGE	Rating		Unit
SO8 narrow	450	*1	mW
TSSOP8	330	*2	mW
TSSOP8 $3 \times 3mm^2$	310	*3	mW

* Degradation is done at 4.5mW/℃(*1), 3.3mW/℃(*2), 3.1mW/℃(*3) for operation above 25℃

REV.A

◇ RECOMMENDED OPERATING CONDITION

Symbol	Parameter	Min	Max	Unit
Vcc	Supply Voltage	1.8	5.5	V
T_A	Ambient Operating Temperature	-40	85	°C

◇ DC OPERATING CHARACTERISTICS
(Unless otherwise specified Ta=-40~85°C, Vcc=1.8~5.5V)

Parameter	Symbol	Min.	Max.	Unit	Test condition
Input Leakage Current (SCL,SDA)	I_{LI}	-	±2	μA	V_{IN}=Vss or Vcc
Output Leakage Current	I_{LO}	-	±2	μA	V_{OUT}= Vss or Vcc(SDA in Hi-Z)
Supply Current	I_{CC}	-	0.8	mA	Vcc=1.8V, f_C=400kHz
Stand-by Supply Current	I_{CC1}	-	0.3	μA	V_{IN} =Vss or Vcc, Vcc=1.8V
Input Low Voltage (E2,E1,E0,SCL,SDA)	V_{IL}	-	0.3Vcc	V	2.5V≦Vcc≦5.5V
			0.2Vcc		1.8V≦Vcc<2.5V
Input Low Voltage (WC)	V_{IL}	-	0.5	V	2.5V≦Vcc≦5.5V
			0.2Vcc		1.8V≦Vcc<2.5V
Input High Voltage (E2,E1,E0,SCL,SDA,WC)	V_{IH}	0.7Vcc	-	V	2.5V≦Vcc≦5.5V
		0.8Vcc			1.8V≦Vcc<2.5V
Output Low Voltage	V_{OL}	-	0.2	V	I_{OL}=0.7mA, Vcc=1.8V

○This product is not designed for protection against radioactive rays.

◇ AC OPERATING CHARACTERISTICS
(Unless otherwise specified Ta=-40~85°C, Vcc=1.8~5.5V)

Parameter	Symbol	Min	Max	Unit
Clock Frequency	f_C	-	100	kHz
Clock Pulse Width High	t_{CHCL}	4000	-	ns
Clock Pulse Width Low	t_{CLCH}	4700	-	ns
SDA Fall Time *1	t_{DLIDL2}	20	300	ns
Data In Set Up Time	t_{DXCX}	250	-	ns
Data In Hold Time	t_{CLDX}	0	-	ns
Data Out Hold Time	t_{CLQX}	200	-	ns
Clock Low to Next Data Valid(Access Time)	t_{CLQV}	200	3500	ns
Start Condition Set Up Time	t_{CHDX}	4700	-	ns
Start Condition Hold Time	t_{DLCL}	4000	-	ns
Stop Condition Set Up Time	t_{CHDH}	4000	-	ns
Time between Stop Condition and Next Start Condition	t_{DHDL}	4700	-	ns
Write Time	t_W	-	10	ms

*1 Not 100% TESTED

◇ BLOCK DIAGRAM

Fig.-1 BLOCK DIAGRAM

◇ PIN No., PIN NAME

PIN No.	PIN NAME
1	E0
2	E1
3	E2
4	Vss
5	SDA
6	SCL
7	WC
8	Vcc

◇NOTES FOR POWER SUPPLY

Vcc rises through the low voltage region in which internal circuit of IC and the controller are unstable, so that device may not work properly due to an incomplete reset of internal circuit. To prevent this, the device has the feature of P.O.R. and LVCC. In the case of power up, keep the following conditions to ensure functions of P.O.R. and LVCC.

1. It is necessary to be "SDA='H'" and "SCL='L' or 'H'".
2. Follow the recommended conditions of tR, tOFF, Vbot for the function of P.O.R. during power up.
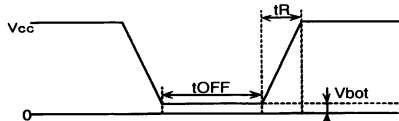

Fig.-2 Vcc RISING WAVEFORM

◇RECOMMENDED CONDITIONS OF tR, tOFF, Vbot

tR	tOFF	Vbot
Below 10ms	Above 10ms	Below 0.3V
Below 100ms	Above 10ms	Below 0.2V

3. Prevent SDA and SCL from being "High-Z".

In case that condition 1. and/or 2. cannot be met, take following actions.

A) Unable to keep condition 1.
(SDA is "LOW" during power up.)
→ Control SDA ,SCL to be "HIGH" as Fig.-3(a), 3(b).

B) Unable to keep condition 2.
→ After power becomes stable, execute software reset.

C) Unable to keep both conditions 1 and 2.
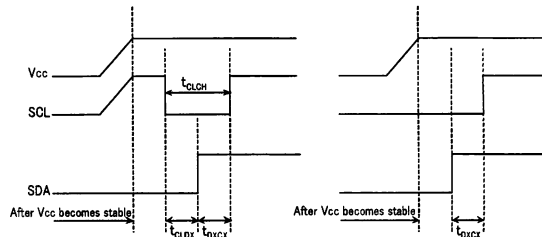→ Follow the instruction A first, then the instruction B.

Fig.-3(a) SCL='H' and SDA='L'   Fig.-3(b) SCL='L' and SDA='L'

◇CAUTIONS ON USE

(1) Absolute maximum ratings

If the absolute maximum ratings such as impressed voltage and action temperature range and so forth are exceeded, LSI may be destructed. Do not impress voltage and temperature exceeding the absolute maximum ratings. In the case of fear exceeding the absolute maximum ratings, take physical safety countermeasures such as fuses, and see to it that conditions exceeding the absolute maximum ratings should not be impressed to LSI.

(2) Vss electric potential

Set the voltage of Vss terminal lowest at any action condition. Make sure that each terminal voltage is lower than that of Vss terminal.
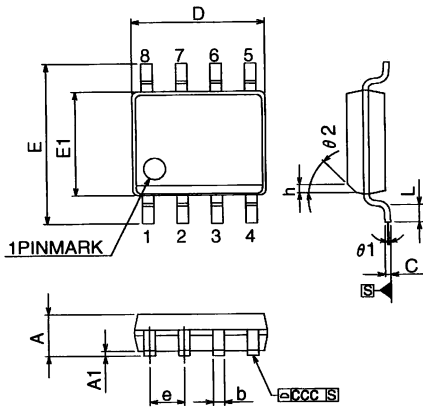
(3) Thermal design

In consideration of permissible loss in actual use condition, carry out heat design with sufficient margin.

(4) Terminal to terminal shortcircuit and wrong packaging

When to package LSI onto a board, pay sufficient attention to LSI direction and displacement. Wrong packaging may destruct LSI. And in the case of shortcircuit between LSI terminals and terminals and power source, terminal and Vss owing to foreign matter, LSI may be destructed.

(5) Use in a strong electromagnetic field may cause malfunction, therefore, evaluated design sufficiently.
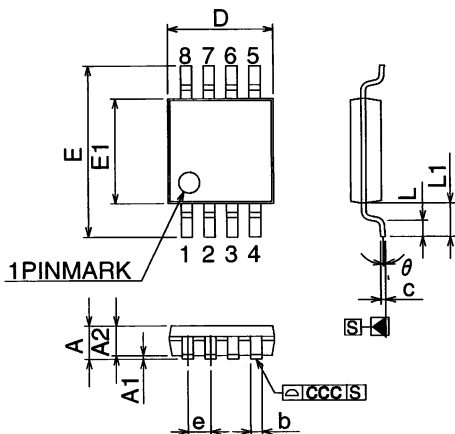
◇ PHYSICAL DIMENSION

◇ SO8 narrow Package size data

Symb.	mm			inches		
	Typ.	Min.	Max.	Typ.	Min.	Max.
A	–	1.35	1.75	–	0.053	0.069
A1	–	0.10	0.25	–	0.004	0.010
b	–	0.33	0.51	–	0.013	0.020
c	–	0.19	0.25	–	0.007	0.010
D	–	4.80	5.00	–	0.189	0.197
e	1.27	–	–	0.050	–	–
E	–	5.80	6.20	–	0.228	0.244
E1	–	3.80	4.00	–	0.150	0.157
L	–	0.40	1.27	0.050	0.016	0.050
$\theta 1$	–	0°	8°	–	0°	8°
ccc	–	–	0.10	–	–	0.004
h	–	0.25	0.50	–	0.010	0.020
$\theta 2$	45°	–	–	45°	–	–

Notes 1.This drawing is subject to change without notice.
2.Body dimensions do not include mold flash or protrusion, or gate burns.
3.Reference JEDEC MS-012 variation AA.

Fig.-4 SO8 narrow Package Outline
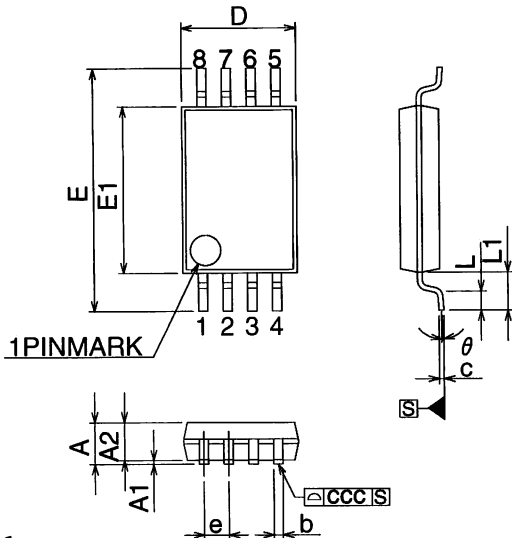
Notes 1.This drawing is subject to change without notice.
2.Body dimensions do not include mold flash or protrusion, or gate burns.
3.Reference JEDEC MO-153 variation AA.

Fig.-5 TSSOP Package Outline

◇ TSSOP8 Package size data

Symb.	mm			inches		
	Typ.	Min.	Max.	Typ.	Min.	Max.
A	-	-	1.200	-	-	0.0472
A1	-	0.050	0.150	-	0.0020	0.0059
A2	1.000	0.800	1.050	0.0394	0.0315	0.0413
b	-	0.190	0.300	-	0.0075	0.0118
c	-	0.090	0.200	-	0.0035	0.0079
D	3.000	2.900	3.100	0.1181	0.1142	0.1220
e	0.650	-	-	0.0256	-	-
E	6.400	6.200	6.600	0.2520	0.2441	0.2598
E1	4.400	4.300	4.500	0.1732	0.1693	0.1772
L	0.600	0.450	0.750	0.0236	0.0177	0.0295
L1	1.000	-	-	0.0394	-	-
ccc	-	-	0.100	-	-	0.0039
θ	-	0°	8°	-	0°	8°

◇ TSSOP8 3 × 3mm² Package size data

Symb.	mm			inches		
	Typ.	Min.	Max.	Typ.	Min.	Max.
A	–	–	1.100	–	–	0.0433
A1	–	0.050	0.150	–	0.0020	0.0059
A2	0.850	0.750	0.950	0.0335	0.0295	0.0374
b	–	0.250	0.400	–	0.0098	0.0157
c	–	0.120	0.230	–	0.0047	0.0091
D	3.000	2.900	3.100	0.1181	0.1142	0.1220
e	0.650	–	–	0.0256	–	–
E	4.900	4.650	5.150	0.1929	0.1831	0.2028
E1	3.000	2.900	3.100	0.1181	0.1142	0.1220
L	0.550	0.400	0.700	0.0217	0.0157	0.0276
L1	0.950	–	–	0.0374	–	–
ccc	–	–	0.100	–	–	0.0039
θ	–	0°	6°	–	0°	6°

Notes 1.This drawing is subject to change without notice.
2.Body dimensions do not include mold flash or protrusion, or gate burns.
3.Reference JEDEC MO-187 variation AA.

Fig.-6 TSSOP 3 × 3mm² Package Outline

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