Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

Rohm Semiconductor
BH6111FV-E2

For any questions, you can email us directly:
sales@integrated-circuit.com

Power unit IC for pagers

BH6111FV

The BH6111FV is a power unit IC with a driver for VFM switching regulator controllers and vibrators, LEDs, speakers, and LCD backlights. It has internal sensors to detect the reset voltage and battery ejection.

●Applications
Pagers

●Features
1) Internal VFM-type CMOS switching regulator and drivers for 6 channels.
2) Equipped with a reset voltage sensor and battery ejection sensor.

●Absolute maximum ratings (Ta = 25°C)

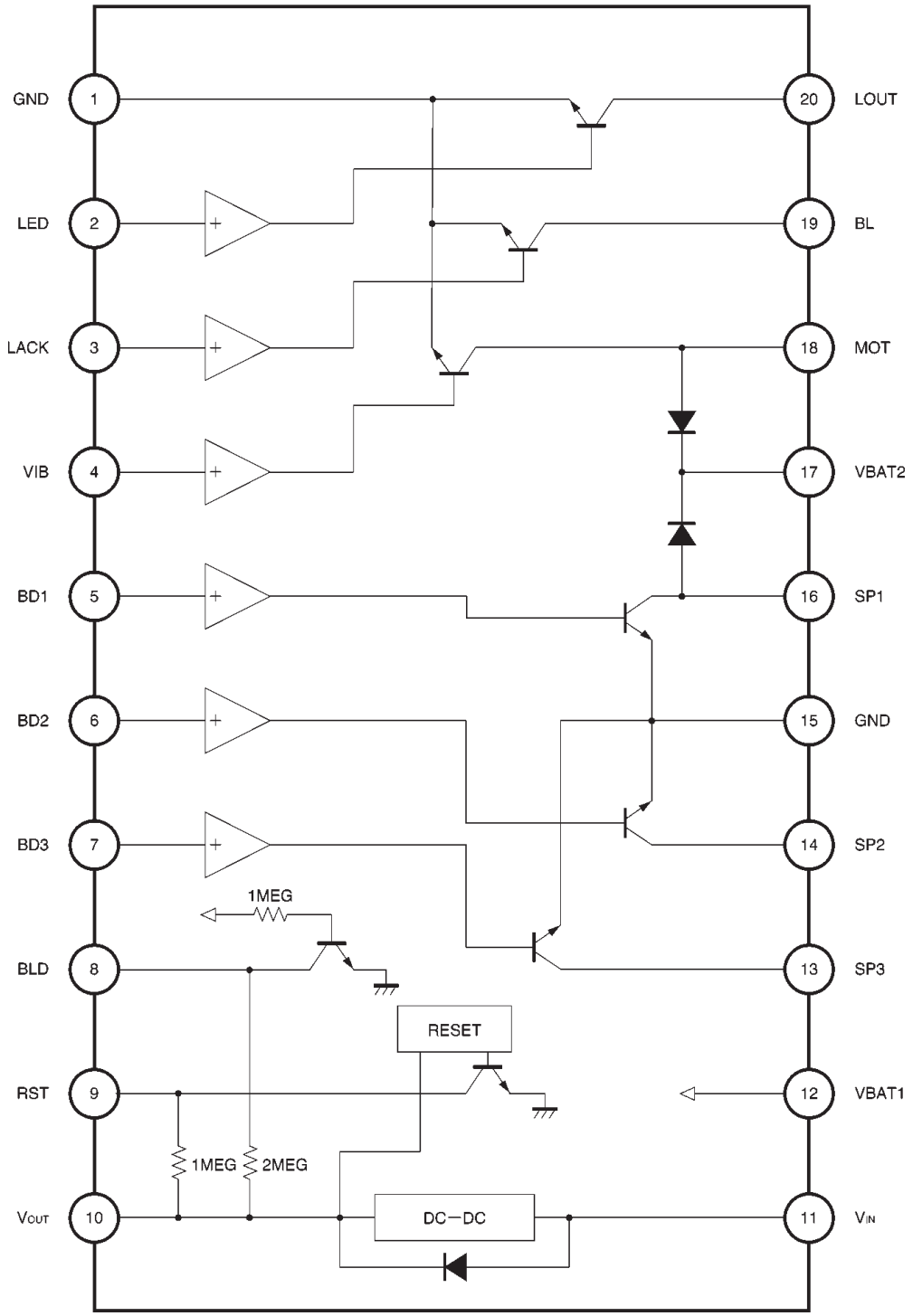
Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	−0.3～+6.0	V
Driver output applied voltage	$V_{Max.}$	−0.3～+7.0	V
Power dissipation	Pd	*400	mW
Maximum driver output current (1)	$I_{OM}1$	500	mA
Maximum driver output current (2)	$I_{OM}2$	400	mA
Maximum driver output current (3)	$I_{OM}3$	300	mA
Operating temperature	T_{opr}	−15～+60	℃
Storage temperature	T_{stg}	−55～+125	℃

* Reduced by 4 mW for each increase in Ta of 1℃ over 25℃.

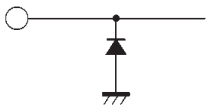
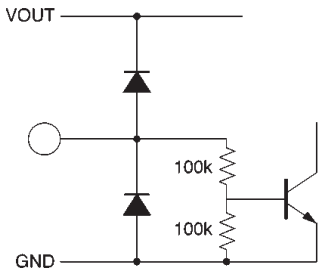
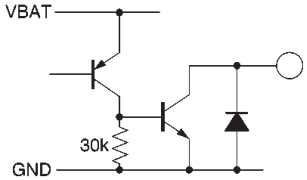
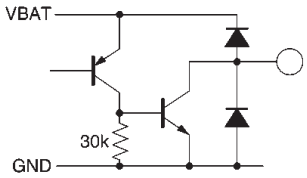
●Recommended operating conditions

Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	0.9～2.5	V
Driver unit operating frequency	f_{drv}	DC～100	kHz

●Block diagram



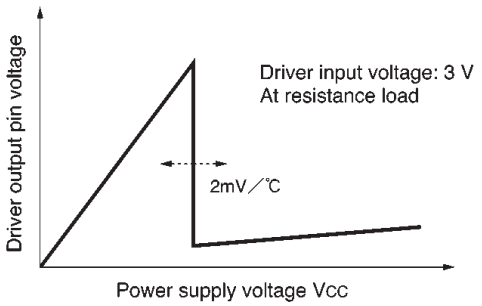
●Pin descriptions

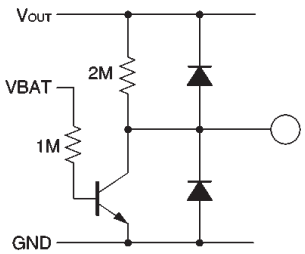
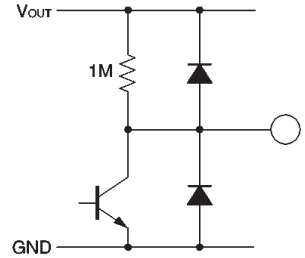
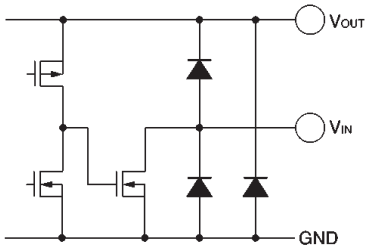
Pin No.	Pin name	I/O	Pin voltage	Internal equivalent circuit	Function
1 15	GND 2 GND 1	I I	GND		Grounding pin
12 17	VBAT 1 VBAT 2	I I	VBAT		Battery pin
2 3 4 5 6 7	LED LACK VIB BD 1 BD 2 BD 3	I I I I I I	0V		Driver input pin ∗1 ∗2 ∗3
13 14 19 20	SP 3 SP 2 BL LOUT	O O O O	—		Driver output pin
16 18	SP 1 MOT	O O	—		Driver output pin (internal Di for surge absorption)

∗1 Driver unit input current (3 V system)
LED, LACK, VIB, BD1, BD2, BD3: 27 μA

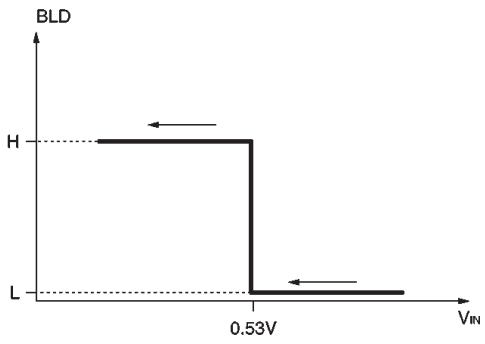
∗2 Driver unit current consumption (1.5 V system)
LED, LACK, SP2, SP3: 4.1 mA
SP1 : 4.7 mA
VIB : 5.6 mA

∗3 Driver unit temperature characteristic
(Low level hold boundary voltage)

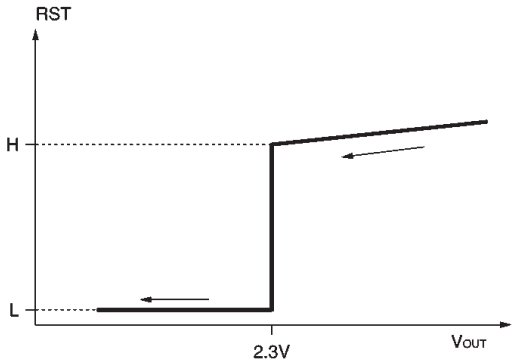


Pin No.	Pin name	I/O	Pin voltage	Internal equivalent circuit	Function
8	BLD	O	—		Battery ejection voltage detection pin *4 (When battery is removed: HIGH) Current consumption 1.5 V system: 0.9 μA 3 V system : 1.5 μA
9	RST	O	—		CPU reset voltage detection pin *5 (When output power is reduced: LOW) Current consumption 3 V system: 1.8 μA
10	VOUT	O	3V		DC/DC converter output pin
11	VIN	I	—		DC/DC converter switching pin (internal Di for rectification)

*4 Operation theory for battery ejection circuit



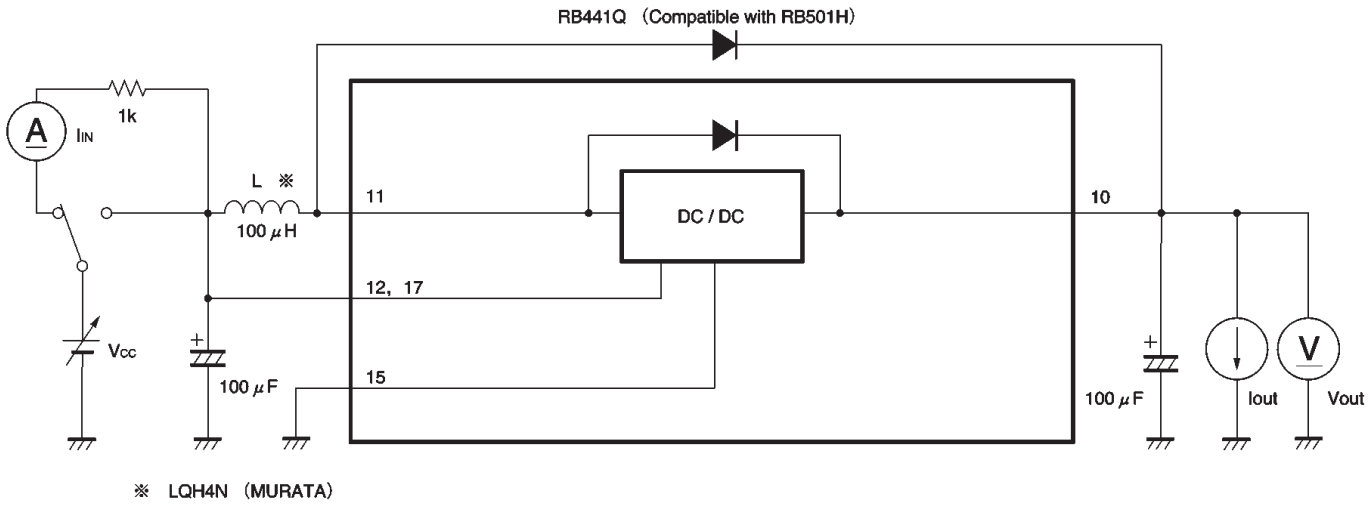
*5 Operation theory for CPU reset circuit



●Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{DD} = 1.5V)

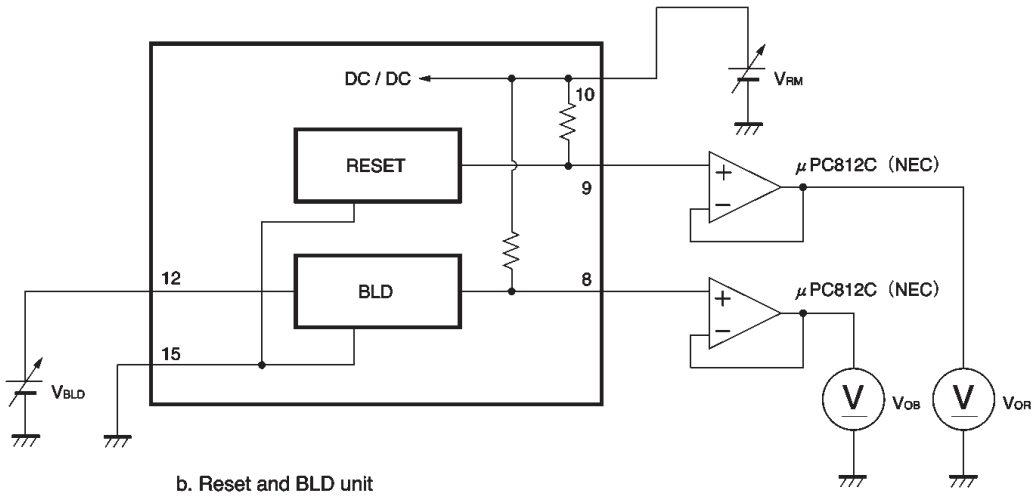
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Measurement circuit
〈Overall circuit〉							
Current dissipation	I_{IN}	—	34	60	μA	With no load on DC-DC converter	Fig.1
〈DC-DC converter unit〉							
Output voltage	V_{OUT}	2.85	3.00	3.08	V	I_{OUT}=1.0mA	Fig.1
Operation initiation power supply voltage	V_{ST}	—	0.85	0.9	V	I_{OUT}=1.0mA, V_{CC} ; 0V→2V	Fig.1
Operation sustain power supply voltage	V_{hld}	—	0.50	0.7	V	I_{OUT}=1.0mA, V_{CC} ; 2V→0V	Fig.1
Input voltage stability	△Vo1	—	20	100	mV	I_{OUT}=1.0mA, V_{CC}=0.9～2.5V	Fig.1
Load regulation	△Vo2	—	20	100	mV	I_{OUT}=0.1～5.0mA	Fig.1
Oscillation duty ratio	$Df_{Max.}$	—	70	—	%		Fig.1
Oscillation frequency	fosc	80	100	120	kHz		Fig.1
Efficiency	η	70	80	—	%	I_{OUT}=3.0mA	Fig.1
〈CPU reset circuit / battery ejection circuit unit〉							
Reset detection voltage	VRM	2.1	2.3	2.5	V		Fig.1
BLD detection voltage	VBLD	0.48	0.53	0.58	V	V_{CC} value when V8 pin is 1.5 V	Fig.1
Output high level voltage	VOH	2.7	3.0	—	V		Fig.1
Output low level voltage	VOL	—	0.1	0.4	V		Fig.1
〈Vibrator control unit〉							
Maximum output drive current	$I_{OM}1$	300	—	—	mA	Vsat≦0.5V	Fig.1
Saturation voltage	Vsat1	—	0.2	0.3	V	I_{OUT}=195mA	Fig.1
Leakage current when off	IL1	—	0.0	5.0	μA	V_{OUT}=5V	Fig.1
Input threshold level	Vth1	1.0	1.4	1.8	V		Fig.1
Input current	$I_{IN}1$	15	27	35	μA	V_{IN}=3.0V	Fig.1
〈Speaker control unit 1〉							
Maximum output drive current	$I_{OM}2$	200	—	—	mA	Vsat≦0.5V	Fig.1
Saturation voltage	Vsat2	—	0.1	0.2	V	I_{OUT}=90mA	Fig.1
Leakage current when off	IL2	—	0.0	5.0	μA	V_{OUT}=5V	Fig.1
Input threshold level	Vth2	1.0	1.4	1.8	V		Fig.1
Input current	$I_{IN}2$	15	27	35	μA	V_{IN}=3.0V	Fig.1
〈Speaker control units 2 and 3, LED control unit, LCD backlight control unit〉							
Maximum output drive current	$I_{OM}3$	100	—	—	mA	Vsat≦0.5V	Fig.1
Saturation voltage	Vsat3	—	0.1	0.2	V	I_{OUT}=45mA	Fig.1
Leakage current when off	IL3	—	0.0	5.0	μA	V_{OUT}=5V	Fig.1
Input threshold level	Vth3	1.0	1.4	1.8	V		Fig.1
Input current	$I_{IN}3$	15	27	35	μA	V_{IN}=3.0V	Fig.1

●Measurement circuits

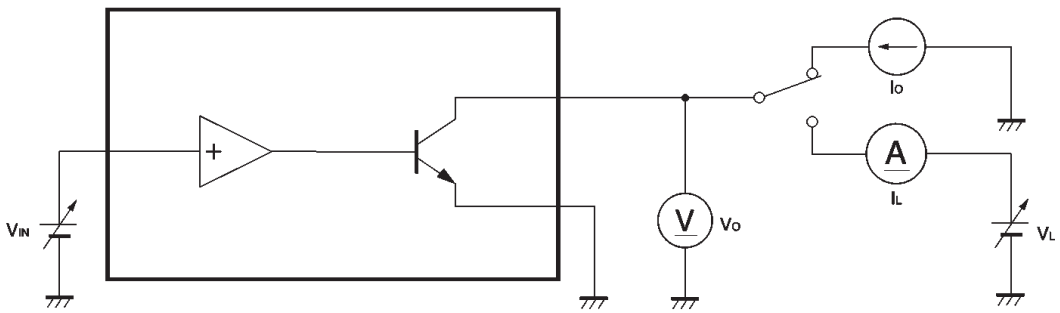


※ LQH4N (MURATA)

a. DC / DC converter unit



b. Reset and BLD unit



c. Driver unit

Fig. 1

●Application example

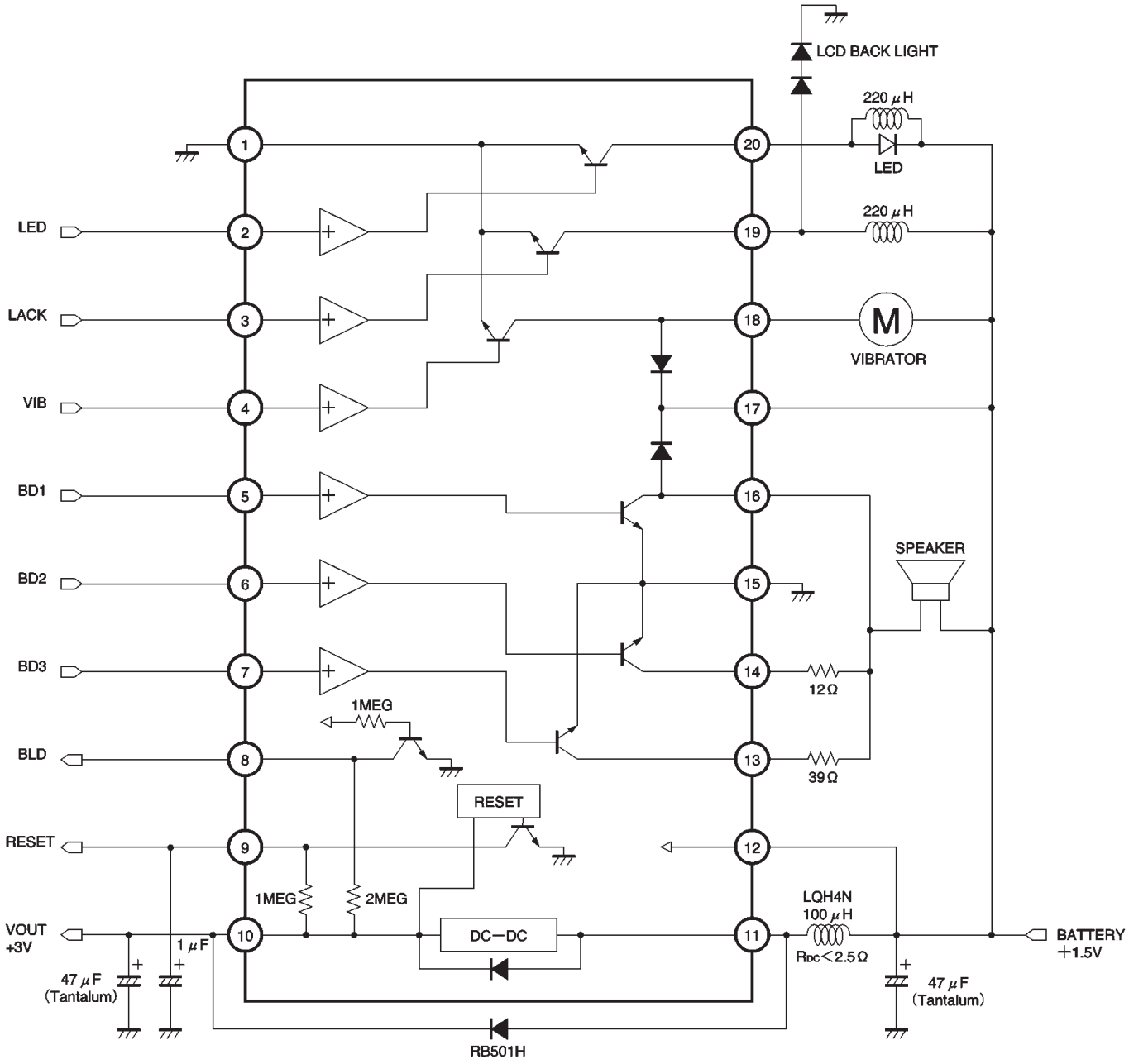


Fig. 2

●Electrical characteristic curves

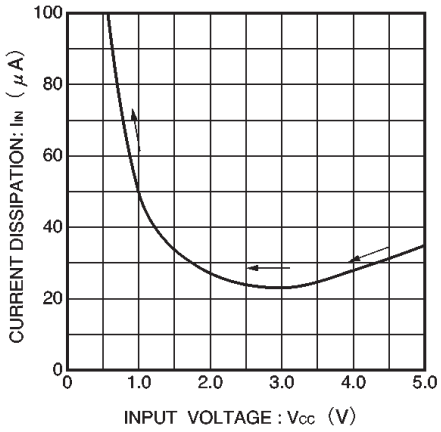


Fig. 3 Current dissipation vs. input voltage

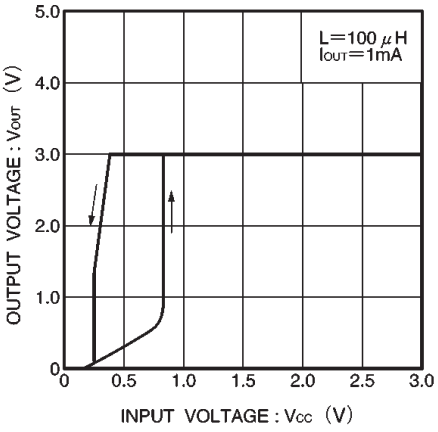


Fig. 4 DC/DC converter Output voltage vs. input voltage

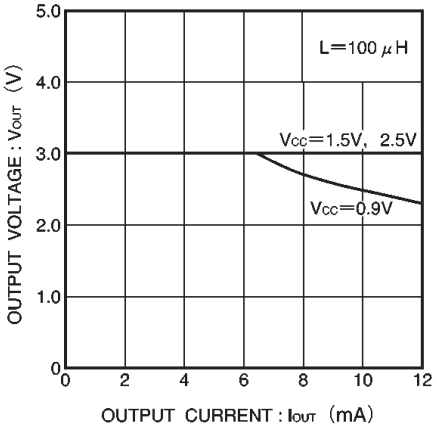


Fig. 5 DC/DC converter Output voltage vs. output current

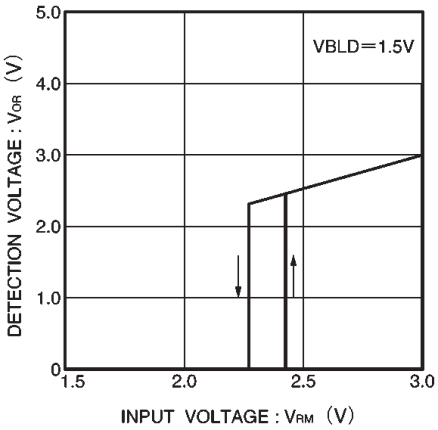


Fig. 6 Reset detection voltage

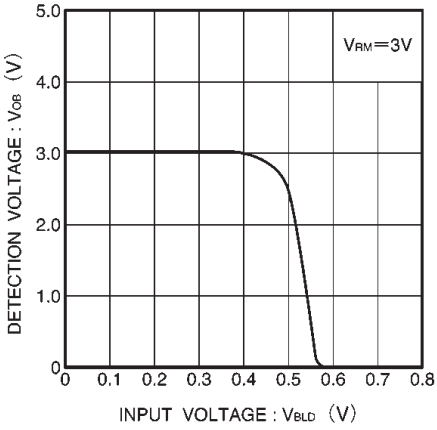


Fig. 7 BLD detection voltage

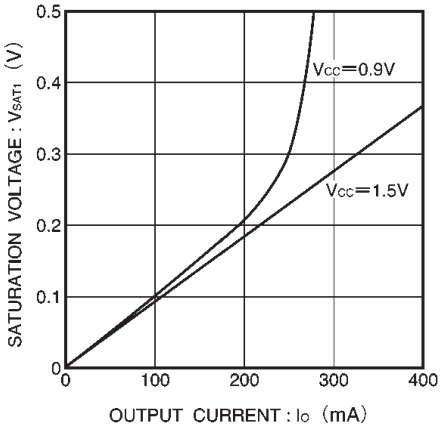


Fig. 8 Vibrator control unit Saturation voltage vs. output current

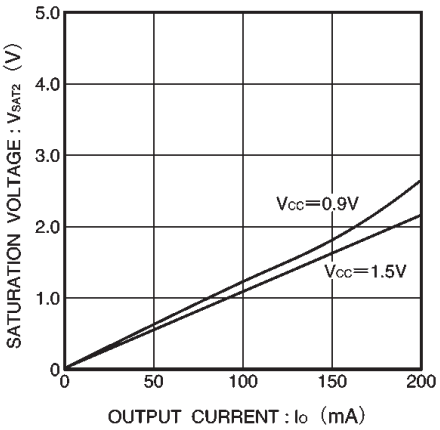


Fig. 9 Speaker control unit 1 Saturation voltage vs. output current

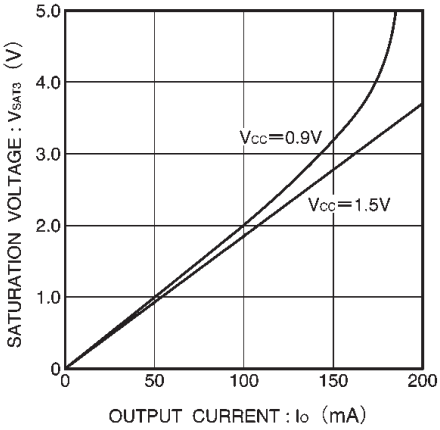
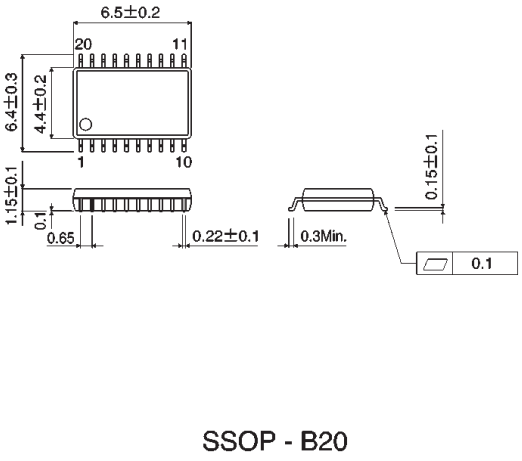


Fig. 10 Speaker control units 2 and 3, LED control unit, LCD backlight control unit Saturation voltage vs.output current

●External dimensions (Units: mm)



SSOP - B20