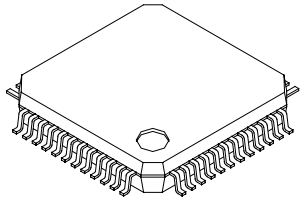
SONY

CXA2534Q

4-Channel CD Motor Driver

48 pin QFP (Plastic)



Description

CXA2534Q is a 4-channel H-bridge motor driver IC designed for portable CD systems. It has a built-in DC to DC converter controller that allows voltage step-up to typically 3.2 V; this voltage can be used to power the system DSP, SSP and micro-controller. In addition, it also provides a PWM regulated power supply to the H-bridge output stage so as to ensure high efficiency.

Features

- 4 channels of H-bridge drivers
- PWM regulated power supply for H-bridge output stages
- Step-up DC to DC converter controller for system power supply
- Start and off controls with soft start capability
- Reset pulse
- Short circuit protect
- Over-voltage protect
- Low battery voltage detection
- Rechargeable battery charger
- General purpose operational amplifier
- Thermal shut-down for battery charger and H-bridge driver (170 °C/140 °C)
- Direct interface with wired remote controller possible

Applications

Portable CD player

Structure

Bipolar silicon monolithic IC

E99145-TE

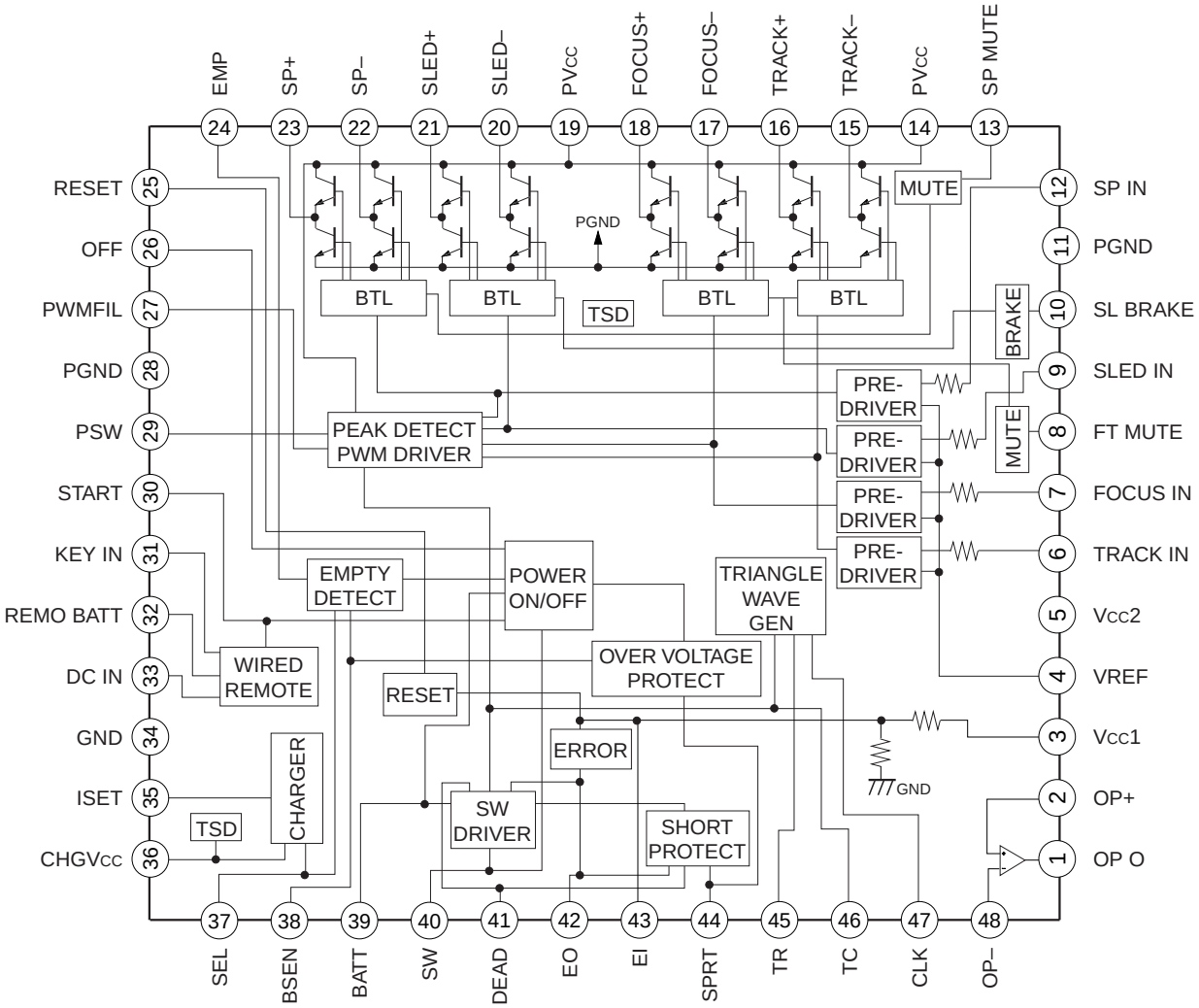
Absolute Maximum Ratings (Ta=25 °C)

Item	Symbol	Rating	Unit
Supply voltage	$V_{CC}1$, $V_{CC}2$, PV_{CC}	13.5	V
Spindle channel output current	Io (spindle)	400	mA
Sled channel output current	Io (sled)	300	mA
Focus channel output current	Io (focus)	200	mA
Track channel output current	Io (track)	200	mA
Allowable power dissipation	P_D	660	mW
operating temperature	Topr	–20 to +75	°C
Storage temperature	Tstg	–65 to +150	°C

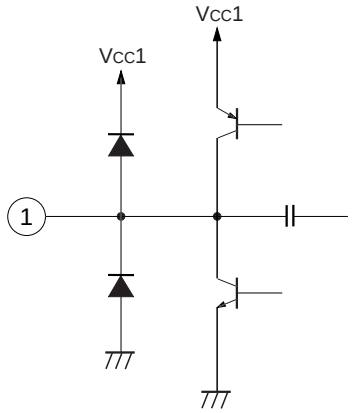
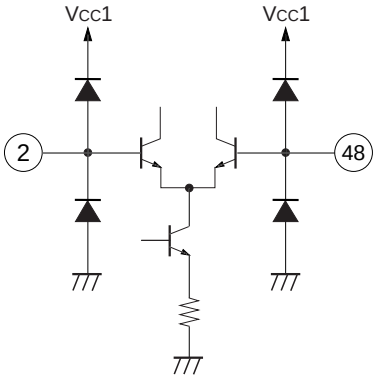
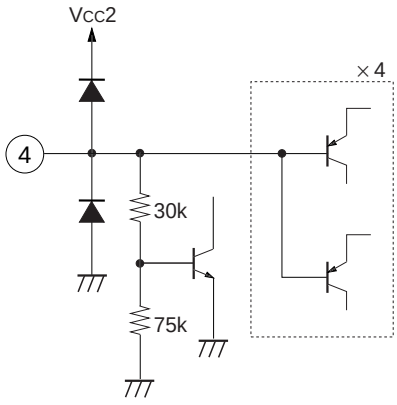
Recommended Operating Conditions (Ta=25 °C)

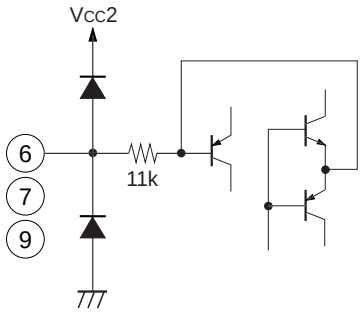
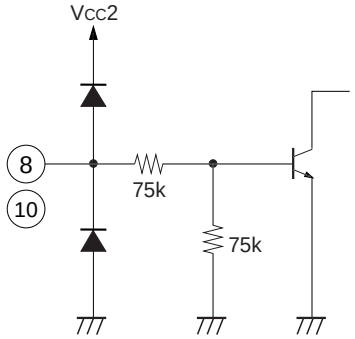
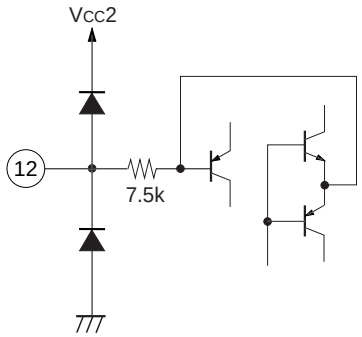
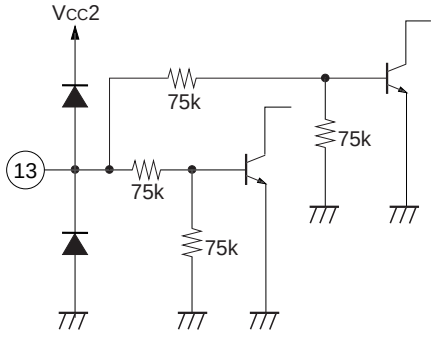
Item	Symbol	Min	Typ	Max	Unit
System 1 supply voltage	$V_{CC}1$	2.7	3.2	5.5	V
System 2 supply voltage	$V_{CC}2$	2.7	3.2	5.5	V
Power V_{CC}	PV_{CC}	—	PWM	Batt	V
Battery supply voltage	Batt	1.5	2.4	8	V
Battery charger supply voltage	ChgV_{CC}	3	4.5	8	V
Operating temperature	Ta	–10	25	70	°C

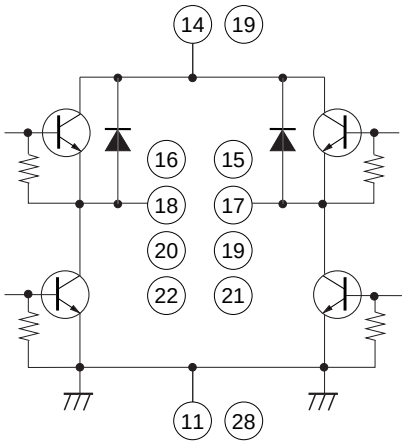
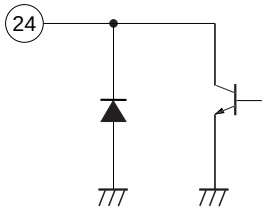
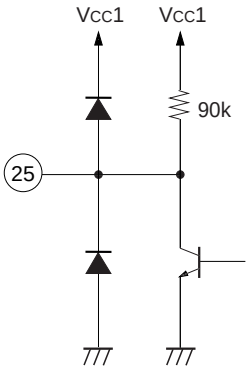
Block Diagram

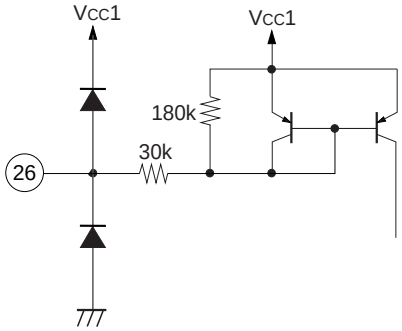
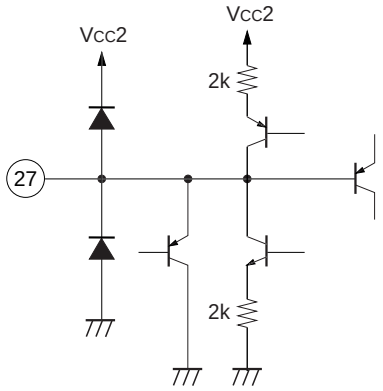
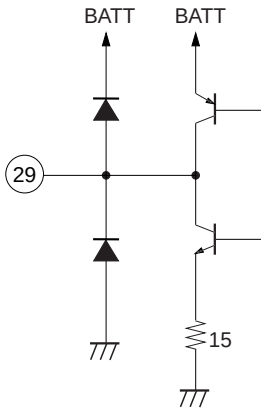


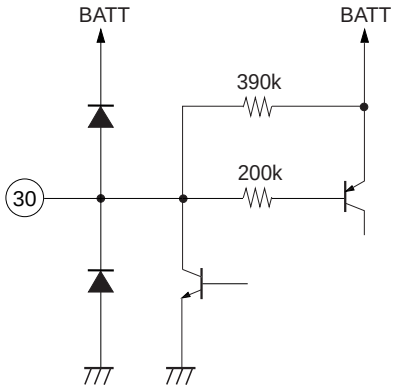
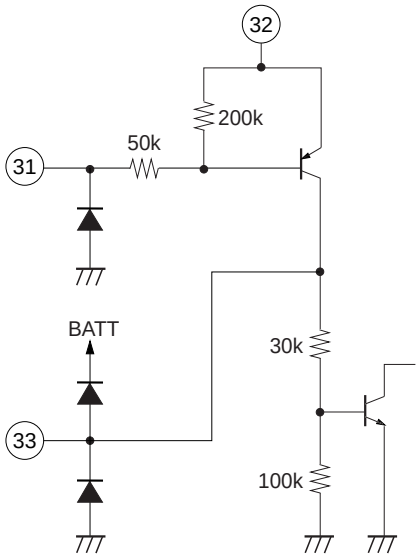
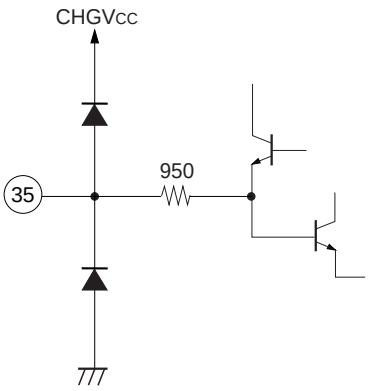
Pin Description

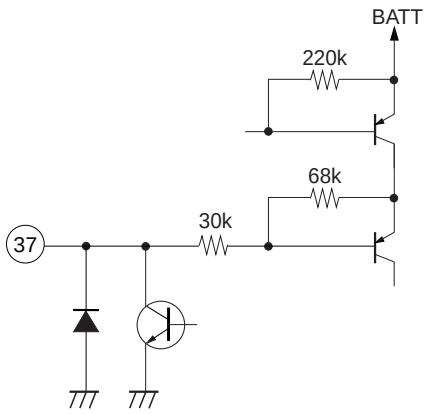
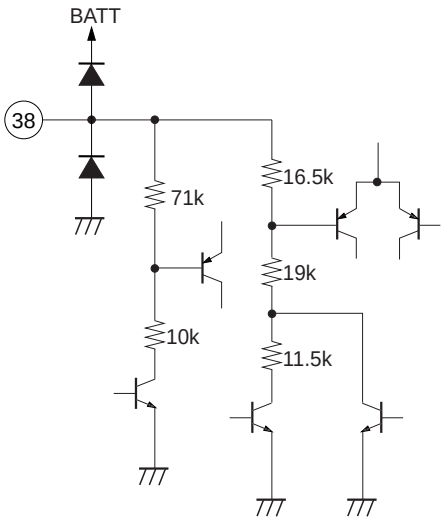
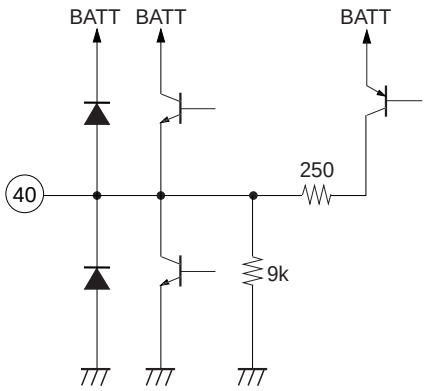
Pin No.	Symbol	Pin Voltage	Equivalent circuit	Description
1	OP O	—		Output pin of built-in operational amplifier
2	OP+	—		Non-inverting input pin of operational amplifier
48	OP–			Inverting input pin of operational amplifier
3	Vcc1	3.2 V		Power supply input to DC-DC controller circuits
4	VREF	1.6 V		Reference Voltage
5	Vcc2	3.2 V		Power supply input to pre-driver circuits

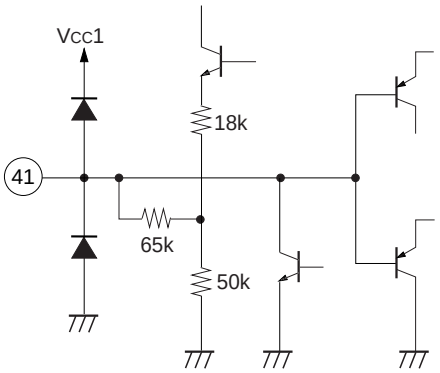
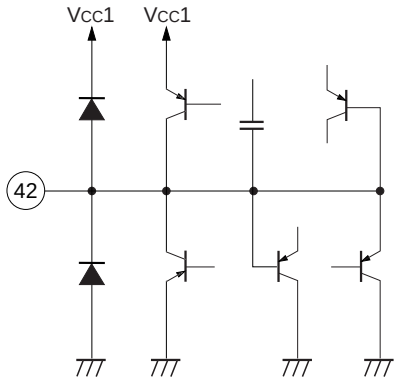
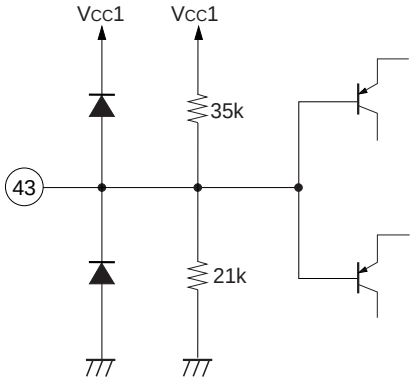
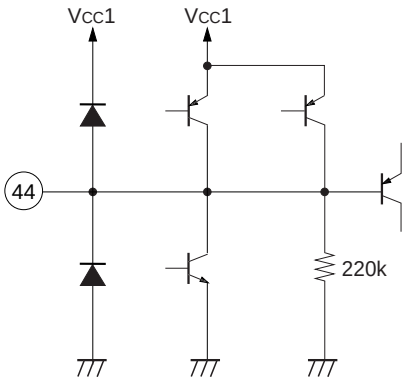
Pin No.	Symbol	Pin Voltage	Equivalent circuit	Description
6	TRACK IN	1.6 V		Tracking error signal input pin
7	FOCUS IN			Focus error signal input pin
9	SLED IN			Sled error signal input pin
8	FT MUTE	0 V		Focus and Tracking mute input pin
10	SL BRAKE			Sled motor brake input pin
11	PGND	0 V		Power ground for H-bridge drivers
28				
12	SP IN	1.6 V		Spindle error signal input pin
13	SP MUTE	0 V		Spindle mute input

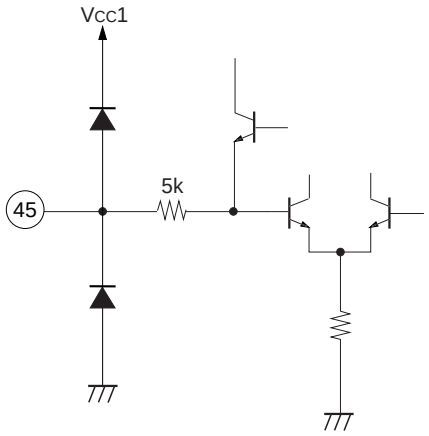
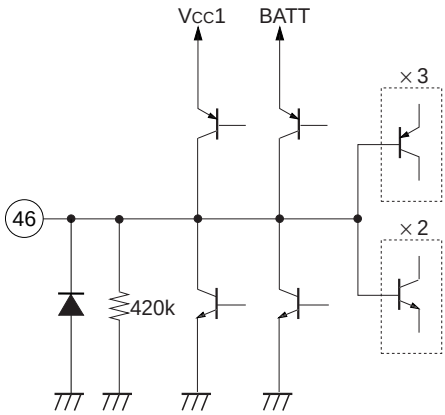
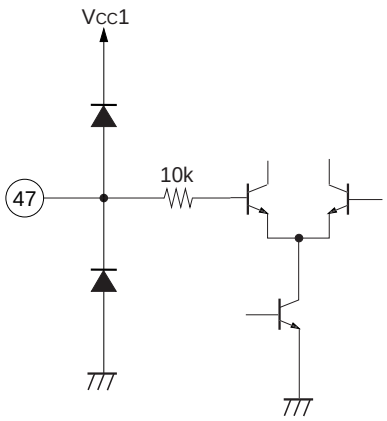
Pin No.	Symbol	Pin Voltage	Equivalent circuit	Description
14 19	PVCC	—		Power supply input for H-bridge drivers
15	TRACK–	—		Negative output pin to tracking motor
16	TRACK+			Positive output pin to tracking motor
17	FOCUS–			Negative output pin to focus motor
18	FOCUS+			Positive output pin to focus motor
20	SLED–			Negative output pin to sled motor
21	SLED+			Positive output pin to sled motor
22	SP–			Negative output pin to spindle motor
23	SP+			Positive output pin to spindle motor
24	EMP	—		Battery empty detection output pin
25	RESET	VCC1		Reset output pin

Pin No.	Symbol	Pin Voltage	Equivalent circuit	Description
26	OFF	Vcc1		Input pin to put IC into standby mode
27	PWMFIL	—		PWM filter pin
29	PSW	—		PWM switching output pin

Pin No.	Symbol	Pin Voltage	Equivalent circuit	Description
30	START	Batt		Input pin to start the IC
31	KEY IN	—		Input pin from wired remote to start the IC
32	REMO BATT	—		Power supply to the built-in wired remote interface circuit
33	DC IN	0 V		Input pin to start the IC when AC adapter is inserted
34	GND	0 V		Ground
35	ISET	1.2 V		Set charging current of built-in battery charger
36	CHGVCC	4.5 V		Power supply input to the battery charger

Pin No.	Symbol	Pin Voltage	Equivalent circuit	Description
37	SEL	—		Detection input pin for battery or AC adapter operation and Battery charging current output pin
38	BSEN	Batt		Detection input pin for battery empty detection
39	BATT	2.4 V		Battery input pin
40	SW	—		DC to DC controller output pulses

Pin No.	Symbol	Pin Voltage	Equivalent circuit	Description
41	DEAD	0.88 V		Soft start pin
42	EO	—		Output pin of error amplifier
43	EI	1.2 V		Input pin of error amplifier
44	SPRT	0 V		Short protection pin

Pin No.	Symbol	Pin Voltage	Equivalent circuit	Description
45	TR	1.2 V		Together with the capacitor at TC, set the start-up and free running frequency of sawtooth
46	TC	—		Together with the resistor at TR, set the start-up and free running frequency of sawtooth
47	CLK	—		Synchronizing clock pulse input

Electrical Specifications

If not specified, Ta=25 °C, Batt=2.4 V, $V_{CC}1=V_{CC}2=3.2$ V, Vref=1.6 V, $ChgV_{CC}=0$ V, fCLK=88.2 kHz

Item		Symbol	Min.	Typ.	Max.	Unit	Condition
1. Overall							
Batt standby current		I_{ST}	—	0	2	μA	Batt=9 V, $V_{CC}1=V_{CC}2=0$ V
Batt quiescent current		I_{BAT}	—	2	3.2	mA	PV_{CC}=PWM, FT Mute=3.2 V
$V_{CC}1$ quiescent current		$IV_{CC}1$	—	4.9	6.7	mA	PV_{CC}=0.45 V, FT Mute=3.2 V, EI=0 V
$V_{CC}2$ quiescent current		$IV_{CC}2$		4.2	6.4	mA	PV_{CC}=0.45 V, FT Mute=3.2 V
$ChgV_{CC}$ quiescent current		$IChgV_{CC}$		0.79	1.2	mA	$ChgV_{CC}$=4.5 V, Rch=open
2. H-Bridge driver							
Voltage gain	Spindle	Gv (sp)	21.9	23.9	25.9	dB	
	Sled	Gv (sled)	14	15.5	17	dB	
	Focus	Gv (focus)	14	15.5	17	dB	
	Track	Gv (track)	14	15.5	17	dB	
Gain difference		ΔGv	–2	0	2	dB	
Input impedance	Spindle	Rin (sp)	5.7	7.5	11	kΩ	IN*=1.7 and 1.8 V
	Sled	Rin (sled)	8.8	11	15	kΩ	
	Focus	Rin (focus)	8.8	11	15	kΩ	
	Track	Rin (track)	8.8	11	15	kΩ	
Maximum output voltage	Spindle	Vom (sp)	1.9	2.1	—	V	IN=0 and 3.2 V, PV_{CC}=4 V
	Sled	Vom (sl)	1.9	2.05	—	V	
	Focus	Vom (foc)	1.9	2.05	—	V	
	Track	Vom (tra)	1.9	2.05	—	V	
Upper Tr saturation voltage	Spindle	V_{SAT} (sp)	—	280	400	mV	Io=400 mA, SP IN=0 and 3.2 V
	Sled	V_{SAT} (sl)	—	280	400	mV	Io=300 mA, SLED IN=0 and 3.2 V
	Focus	V_{SAT} (foc)	—	230	400	mV	Io=200 mA, FOCUS IN=0 and 3.2 V
	Track	V_{SAT} (tra)	—	230	400	mV	Io=200 mA, TRACK IN=0 and 3.2 V
Lower Tr saturation voltage	Spindle	V_{SATL} (sp)	—	230	400	mV	Io=400 mA, SP IN=0 and 3.2 V
	Sled	V_{SATL} (sl)	—	250	400	mV	Io=300 mA, SLED IN=0 and 3.2 V
	Focus	V_{SATL} (foc)	—	200	400	mV	Io=200 mA, FOCUS IN=0 and 3.2 V
	Track	V_{SATL} (tra)	—	200	400	mV	Io=200 mA, TRACK IN=0 and 3.2 V
Input offset voltage		V_{OI}	–5	0	5	mV	
Output offset voltage	Spindle	V_{OO} (sp)	–50	0	50	mV	Vref=IN=1.6 V
	Sled	V_{OO} (sled)					
	Focus	V_{OO} (focus)					
	Track	V_{OO} (track)					
Dead band	Spindle	V_{DB} (sp)	–5	20	45	mV	
	Sled	V_{DB} (sled)	–10	15	40	mV	
	Focus	V_{DB} (focus)	–10	15	40	mV	
	Track	V_{DB} (track)	–10	15	40	mV	SP IN=1.8V
Spindle mute on		$V_{MSP(on)}$	2	—	—	V	SP IN=1.8V
Spindle mute off		$V_{MSP(off)}$	—	—	0.8	V	SLED IN=1.8V
Sled brake on		$V_{BSL(on)}$	2	—	—	V	SLED IN=1.8V
Sled brake off		$V_{BSL(off)}$	—	—	0.8	V	

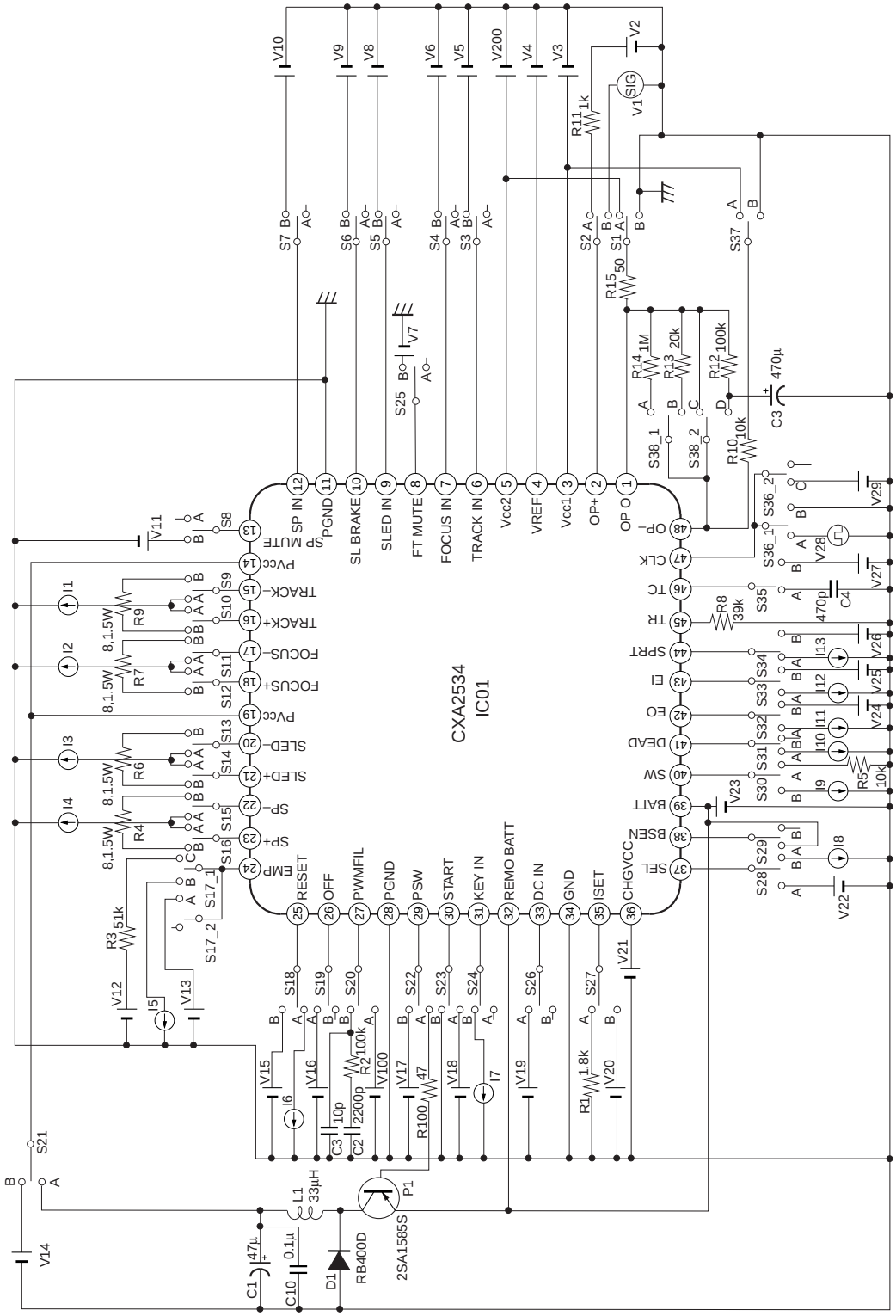
* IN means SP IN, SLED IN, FOCUS IN or TRACK IN.

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Focus/Track mute on	V_{MFT} (on)	—	—	0.8	V	FOCUS IN=1.8 V
Focus/Track mute off	V_{MFT} (off)	2	—	—	V	FOCUS IN=1.8 V
Vref on voltage	Vref (on)	1.2	—	—	V	SP IN=1.8 V
Vref off voltage	Vref (off)	—	—	0.8	V	SP IN=1.8 V
3. PWM driver for PV_{CC}						
PSW output current	I_{PSW}	10	13	17	mA	SLED IN=2.1 V
PVCC shift voltage	V_{SHIF}	0.2	0.3	0.4	V	SLED IN=1.8 V, PV_{CC}–SLED+
PVCC leakage current	IPV_{CC} (leakage)	—	0	3	µA	PV_{CC}=9 V, $V_{CC}1=V_{CC}2$=Batt=0 V
PWM transconductance	G_{PWM}	1/67.5	1/50	1/32.5	1/kΩ	SL IN=1.8 V, PV_{CC}=1.2 to 1.4 V
4. DC to DC converter						
4.1 Error amplifier						
VCC1 threshold voltage	V_{CC1TH}	3.05	3.2	3.37	V	
Hi error output voltage	V_{EOH}	1.5	1.65	—	V	EI=0.7 V, Io=–100 µA
Lo error output voltage	V_{EOL}	—	—	0.2	V	EI=1.36 V, Io=100 µA
4.2 Short circuit and Over voltage protection						
SPRT voltage (normal)	V_{SPR}	—	0.05	0.1	V	EI=1.36 V
SPRT output current (EO=H)	I_{SPR1}	6	10	16	µA	EI=0.7 V, V_{SPR}=0 V
SPRT output current (OFF=L)	I_{SPR2}	12	20	32	µA	EI=1.36 V, OFF=0 V, V_{SPR}=0 V
SPRT output current (Over-voltage)	I_{SPR3}	12	20	32	µA	EI=1.36 V, Batt=9.5 V, V_{SPR}=0 V
SPRT impedance	R_{SPR}	154	220	297	kΩ	
SPRT threshold voltage	V_{SPR} (Th)	1.1	1.23	1.36	V	EI=0.7 V, TC=0 V
Over voltage protect threshold	V_{BSEN} (Th)	8	8.4	9	V	BSEN Voltage
4.3 Sawtooth waveform						
SW high output voltage (Starting)	V_{SWH} (start)	0.78	0.98	1.13	V	Batt=TC=1.5 V, $V_{CC}1=V_{CC}2$=0 V, Io=–2 mA, START=LO
SW high output voltage (Normal)	V_{SWH} (nor)	1	1.5	—	V	TC=0 V, Io=–10 mA, EI=0.7 V SPRT=0 V
SW low output voltage	V_{SWL} (nor)	—	0.1	0.4	V	TC=2 V, Io=10 mA
SW start freq	f_{SW1}	55	85	115	kHz	TC=420 pF, $V_{CC}1=V_{CC}2$=0 V, START=LO
SW free running freq	f_{SW2}	60	70	82	kHz	TC=420 pF, CLK=0 V
SW synchronized freq	f_{SW3}	—	88.2	—	kHz	TC=420 pF, CLK=88.2 kHz
Start freq duty cycle	D_{SW1}	45	55	65	%	TC=420 pF, $V_{CC}1=V_{CC}2$=0 V
Free freq duty cycle	D_{SW2}	70	80	90	%	TC=420 pF, EI=0.7 V, CLK=0 V
Synchronized freq duty cycle	D_{SW3}	65	75	85	%	TC=420 pF, EI=0.7 V
4.4 Soft start						
DEAD pin impedance	R_{DEAD}	55	80	105	kΩ	
DEAD pin voltage	V_{DEAD}	0.72	0.82	0.92	V	

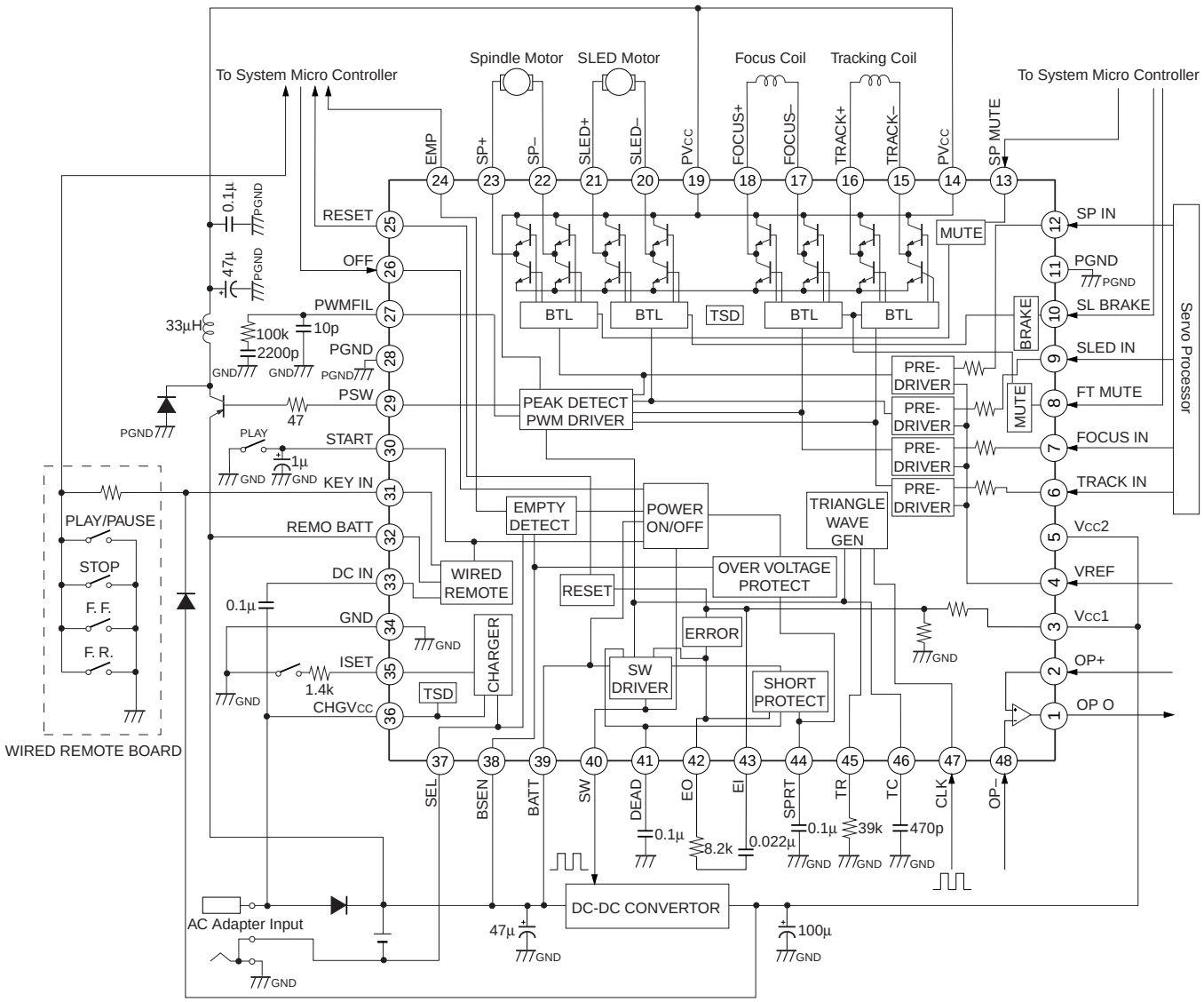
Item		Symbol	Min.	Typ.	Max.	Unit	Condition
4.5 Input							
OFF threshold voltage		V_{OFF} (th)	—	—	V_{CC}–2	V	EI=1.36 V
OFF current		I_{OFF}	55	80	105	µA	OFF=0 V
START on threshold voltage		V_{START1}	—	—	Batt–1	V	V_{CC1}=V_{CC2}=0 V, TC=2 V
START off threshold voltage		V_{START2}	Batt–0.3	—	—	V	V_{CC1}=V_{CC2}=0 V, TC=2 V
START pin current		I_{START}	9	14	19	µA	START=0 V
Clock input voltage	High	V_{CLKH}	2	—	—	V	
	Low	V_{CLKL}	—	—	0.8	V	
Clock current		I_{CLK}	—	5	10	µA	CLK=3.2 V
4.6 Start							
Start cut threshold voltage		V_{ST} (th)	2.3	2.5	2.7	V	V_{CC1}=V_{CC2}=0 V→3.2 V, START=0 V
Start cut hysteresis		V_{ST} (hs)	—	200	—	mV	START=0 V
Discharge threshold voltage		V_{DIS}	1.25	1.45	1.65	V	
5. EMPTY							
Empty detect threshold 1		V_{EMPT1}	1.9	2.0	2.1	V	VSEL=0 V (SEL=LOW)
Empty detect threshold 2		V_{EMPT2}	1.5	1.6	1.7	V	ISEL=–2 µA (SEL=HI Z)
Empty detect hysteresis		V_{EMPH1}	—	50	—	mV	VSEL=0 V (SEL=LOW)
Empty detect hysteresis		V_{EMPH2}	—	50	—	mV	ISEL=–2 µA (SEL=HI Z)
EMPTY pin voltage		V_{EMP}	—	—	0.5	V	Io=1 mA, BSEN=1 V
EMPTY pin leakage current		I_{EMPL}	—	—	1	µA	BSEN=2.4 V
BSEN pin impedance		R_{BSEN}	16.5	22.8	29	kΩ	VSEL=0 V
BSEN pin leakage current		I_{BSENL}	—	—	1	µA	V_{CC1}=V_{CC2}=0 V, BSEN=4.5 V
SEL pin threshold voltage		V_{SEL} (th)	1.3	—	—	V	V_{SEL} (th)=Batt–SEL, BSEN=2 V
SEL pin threshold current		I_{SEL} (th)	–2	—	—	µA	
6. RESET							
Reset threshold voltage		V_{RST} (th)	85	90	95	%	
Reset hysteresis		V_{RST} (hy)	—	50	—	mV	
RESET pin		V_{RST}	—	—	0.4	V	Io=1 mA, V_{CC1}=V_{CC2}=2.8 V
RESET pin impedance		R_{RST}	66	88	118	kΩ	
7. OP AMP							
Input bias current		I_{BIAS}	—	—	250	nA	OP+=1.6 V
Input offset voltage		V_{IO}	–5	0	5	mV	
High output voltage		V_{OH}	2.9	—	—	V	RL=open
Low output voltage		V_{OL}	—	—	0.2	V	RL=open
Output current (Source)		I_{SOU}	—	–8.5	–3	mA	RL=50 Ω to GND
Output current (Sink)		I_{SIN}	0.4	0.8	—	mA	RL=50 Ω to V_{CC1}
Open loop gain		G_{VO}	—	70	—	dB	Vin=–75 dB, f=1 kHz
Slew rate		SR	0.5	1	1.5	V/µS	

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
8. BATTERY CHARGER						
RCHG pin voltage	V_{RCHG}	0.7	0.8	0.9	V	ChgVcc=4.5 V, ISET=1.8 kΩ
RCHG pin impedance	R_{RCHG}	0.68	0.96	1.16	kΩ	ChgVcc=4.5 V, ISET=0.5 and 0.6 V
SEL pin leakage current (RCHG=open)	I_{SEL1}	—	—	1	µA	ChgVcc=4.5 V, ISET=open
SEL pin leakage current (ChgVcc=0.6 V)	I_{SEL2}	—	—	1	µA	ChgVcc=0.6 V, ISET=1.8 kΩ
SEL pin voltage	V_{SEL}	—	0.45	1	V	ChgVcc=4.5 V, Io=300 mA, ISET=0 Ω
9. WIRED REMOTE INTERFACE						
DC IN pin threshold voltage	V_{DCIN} (th)	1	—	—	V	Batt=4 V, Vcc1=Vcc2=0 V, TC=2 V, DC=IN=from 0 to 3 V
KEY IN pin threshold current	I_{KEYIN} (th)	—	—	5	µA	Batt=4 V, Vcc1=Vcc2=0 V, TC=2 V, IKEYIN=from 0 to 10 µA

Electrical Characteristics Test Circuit



Application Circuit



Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

Description of Operation

1. H-Bridge Driver

a) Gain Setting

The input resistances of the Sled, Focus and Track channels are 11 kΩ (typical); the input resistance of the Spindle channel is 7.5 kΩ (typical). The gain can be adjusted by connecting a external resistor, R at the input pin of the channel.

Channel		Unit
Sled channel Focus channel Track channel	$G_V = 20 \log \left\| \frac{55\ k\Omega}{11\ k\Omega + R} \right\|$	dB
Spindle channel	$G_V = 20 \log \left\| \frac{110\ k\Omega}{7.5\ k\Omega + R} \right\|$	dB

R - External Resistor

b) Mute

The Spindle channel operates normally when the SP MUTE (pin 13) is open or at LOW (below 0.8 V). The output will be muted when the SP MUTE pin is at HIGH (above 2 V). This is a high impedance mute as the spindle output voltage will be not pulled to LOW.

The Focus and Track channels share the same mute pin (pin 8). The channels are muted when the FT MUTE pin (pin 8) is open or at LOW level (below 0.8 V). When the Focus and Track channels are muted, the quiescent current at the $V_{CC}2$ pin is also reduced by almost half. This is because the bias are removed when the mute is on.

c) Thermal Shutdown

The H-bridge Driver has an internal thermal shutdown circuit. All the channels outputs will be muted when the chip temperature exceeds 170 °C (typical) and restored when the chip temperature falls to 140 °C (typical).

d) VREF pin

When the VREF pin (pin 4) is below 1 V (typical), the H-bridge driver will be at standby mode and the quiescent current is zero (typical).

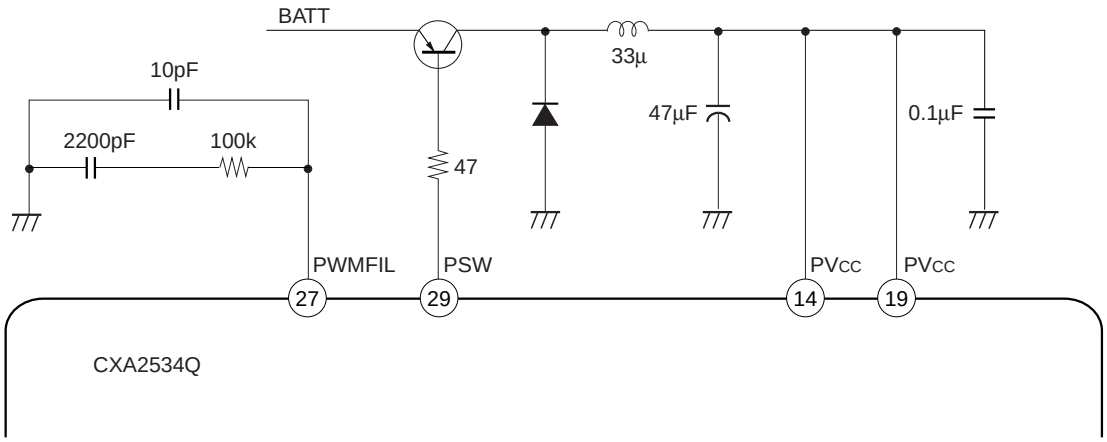
e) Dead Band

Dead band = 2 × input Resistance (attached external resistor + internal resistor) × 0.5 μA

The dead band is depended on input resistance. Thus, the dead band varies with the gain settings.
The dead band is 7.5 mV for Spindle channel and 11 mV for Sled, Focus and Track channels.

f) PWM Driver For PVCC

To ensure the good power efficiency of the H-bridge driver, a Buck DC-to-DC converter may be used to regulate the PVCC. The controller selects the peak voltage among the channels and used it to control the duty cycle of the PWM. External components necessary are: PNP transistor, inductor coil, diode and capacitors. The configuration of a Buck DC-to-DC converter is shown as follow:



g) Bypass Capacitor

To have prevent noise, a bypass capacitor (roughly 0.1 µF) is connected from PVCC pin to the GND pin as close as possible.

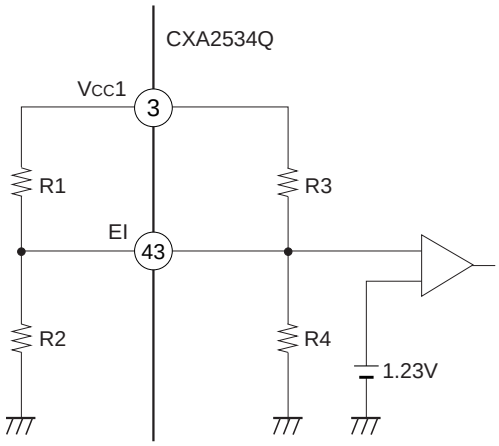
2. DC-to-DC Converter

a) $V_{CC}1$ Voltage Setting

The $V_{CC}1$ voltage can be adjusted by varying the two external resistors, R1 and R2. The formula for $V_{CC}1$ Voltage setting is:

$$V_{CC}1 = 1.23 \frac{\frac{R_1R_3}{R_1+R_3} + \frac{R_2R_4}{R_2+R_4}}{\frac{R_2R_4}{R_2+R_4}} \quad (V)$$

where R_1 - External Resistor
R_2 - External Resistor
R_3 - 35 kΩ
R_4 - 21 kΩ



b) Short Circuit Protection

If the $V_{CC}1$ falls below the designed voltage for a long time, it will be considered as a short circuit at the $V_{CC}1$. In this case, the IC will detect this prolong drop in $V_{CC}1$ and turn off the IC.

When the $V_{CC}1$ is below the designed voltage, the error amplifier will output an HIGH at its EO pin (pin 42). The High level at EO pin will cause the SPRT pin's capacitor (pin 44) to charge up by a constant current of 10 µA. Once the voltage is above 1.23 V (typical), the IC will turn off. The duration of the short circuit can be varied by the SPRT pin's capacitor.

$$t = \frac{1.23V}{10\mu A} \times C_{SPRT} \quad (sec)$$

c) Soft Start

During start-up of the IC, the duty cycle of the DC-to-DC converter is increased slowly to a maximum of 80 %. The $V_{CC}1$ voltage will also increase slowly. This is known as soft start.

During the soft start, the duty cycle of the SW pin (pin 40) is dependent on the voltage at the DEAD pin (pin 41). The DEAD pin is connected to a capacitor which is being charged up by an internal resistance of 65 kΩ. Therefore, the time taken for the duty cycle to reach the maximum is

$$t = C_{SPRT} \times R \quad \text{(sec)} \quad \text{where } R = 65\ k\Omega$$

d) Power Off

To turn off the DC-to-DC Converter, a LOW level is applied to the OFF pin (pin 26). When the OFF pin is low, the IC will not turn off the DC-to-DC converter immediately but will charge up the SPRT pin's capacitor with a constant current of 20 µA. Once the SPRT pin's voltage is above 1.23 V, the IC will then shut down. Therefore, the delay is given by the formula below:

$$t = \frac{1.23\ V}{20\ \mu A} \times C_{SPRT} \quad \text{(sec)}$$

e) Over-Voltage Protection

The IC will detect a over-voltage if the voltage at the BSEN pin is above 8.4 V (typical). When over-voltage occurred, the IC will shut down after a time delay. The time delay is determined by the time taken for the SPRT pin's capacitor to charge above 1.23 V. The charging current for the SPRT pin capacitor is constant and is 20 µA.

$$t = \frac{1.23\ V}{20\ \mu A} \times C_{SPRT} \quad \text{(sec)}$$

f) Reset Pulse

When the $V_{CC}1$ voltage rises above 90 % of the designed value, the RESET pin (pin 25) will change from LOW level to HIGH level. A hysteresis of 50 mV (typical) is implemented to prevent the 'chattering' of the output at RESET pin.

g) Empty Detection

The EMP pin (pin 24) is used to indicate low battery voltage. When the BSEN pin falls below a certain threshold voltage, the EMP pin will change from HIGH to LOW level. There are two threshold voltages, depending on the SEL pin (pin 37). In order to prevent 'chattering' of the output at the EMP pin, a hysteresis of 50 mV (typical) is implemented.

SEL pin	Threshold Voltage (typical)	Recovery Voltage (typical)
LOW	2.0 V	2.05 V
High - Z	1.6 V	1.65 V

3. Battery Charger

The Battery Charger is separated from the rest of the circuit. The ChgVCC pin (pin 36) is the power supply pin to the charger circuit. The charging current is drawn in from the SEL pin (pin 37) and can be set by an external resistor at ISET pin (pin 35). The charger has a built-in thermal shut down circuit. The shut down temperature is set to 170 °C and 140 °C is the recovery temperature.

4. Wired Remote Interface

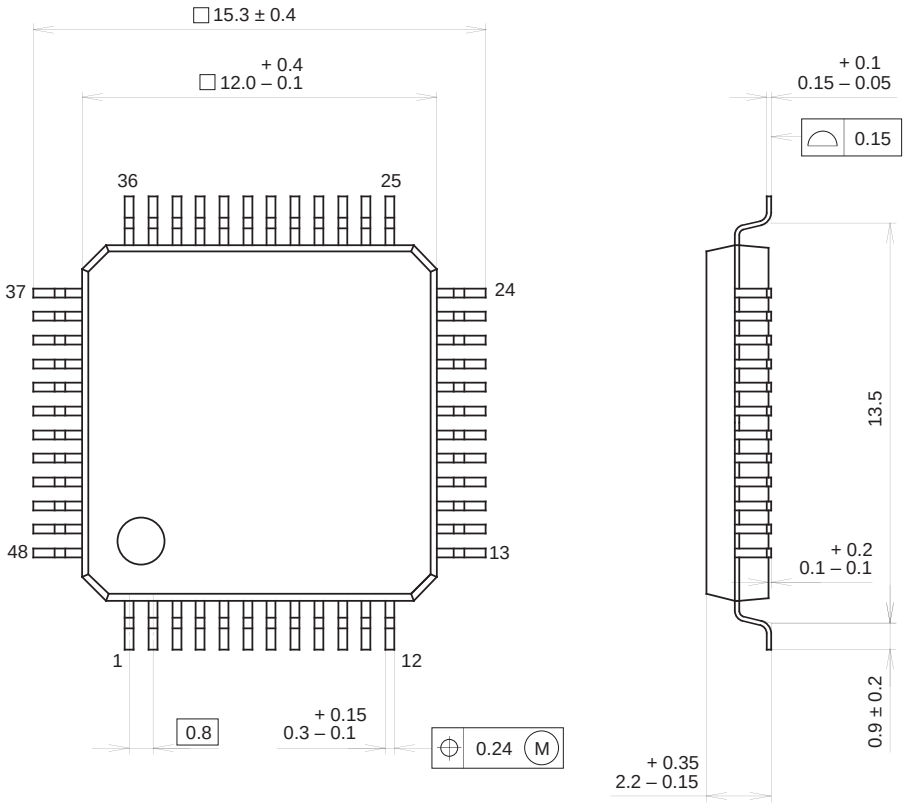
When the IC is at standby, it can be activated by pulling the START pin (pin 30) or the KEY IN pin (pin 31) LOW. The START pin is controlled by the PLAY button on the main set and the KEY IN pin is controlled by the PLAY button on the wired remote control panel.

The wired remote interface circuit is powered at REMO BATT pin (pin 32) which is connected to the BATT. To ensure that the voltage at REMO BATT pin is not greater than VCC1, a resistor and zener diode (Vz=3.1 V) may be necessary.

The DC IN pin (pin 33) will detect a pulse through a series capacitor when a AC adapter is power on. This pulse will activate the IC also.

Package Outline Unit : mm

48PIN QFP (PLASTIC)



SONY CODE	QFP-48P-L04
EIAJ CODE	QFP048-P-1212
JEDEC CODE	————

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER / PALLADIUM PLATING
LEAD MATERIAL	42/COPPER ALLOY
PACKAGE MASS	0.7g

NOTE : PALLADIUM PLATING
This product uses S-Pd PPF (Sony Spec.-Palladium Pre-Plated Lead Frame).

littlediode
COMPONENTS FOR ALL

Littlediode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

LittleDiode.com

Looking forward to providing you with the best possible service.