



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

LV5683P — Monolithic Linear IC For Car Audio Systems Multi Voltage Regulator IC

Overview

The LV5683P is a multi voltage regulator suitable for USB silicon tuner car-audio systems. This IC has 4 outputs, V_{DD} 5V(3.3V), AUDIO(8.5V), SWU(3.3V) and USB5V(CD 8V: available). About protection circuits, it has Over-current-protection, Over-voltage-protection and Thermal-shut-down. V_{CC1} (SWU and USB supply) is independent terminal from V_{CC} , and accepts lower voltage(ex. From DC/DC converter) which enables to reduce power dissipation.

Features

- 4 system regulator
 - V_{DD} (LCD micon) : V_{OUT} 5.0V(3.3V), I_O max 300mA, reverse current prevention.
 - Audio : V_{OUT} 8.5V, I_O max 300mA
 - SWU(systems) : V_{OUT} 3.3V, I_O max 500mA
 - USB : V_{OUT} 5.0V(8.0V available for CD), I_O max 1100mA
- Over-current-protection
- Thermal-shut-down Typ 175°C
- Over-voltage-protection: Typ 21V(except V_{DD})
- Applied Pch-LDMOS for output stages.

(Warning)The protector functions only improve the IC's tolerance and they do not guarantee the safety of the IC if used under the conditions out of safety range or ratings. Use of the IC such as use under overcurrent protection range or thermal shut down state may degrade the IC's reliability and eventually damage the IC.

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Conditions	Conditions	Ratings	Unit
Supply voltage	V_{CC} max		36	V
Allowable Power dissipation	P_d max (* $T_a \leq 25^\circ\text{C}$)	IC unit	1.3	W
		With Al heatsink(50×50×1.5mm ³)	5.3	W
		Infinite heat radiation	26	W
Peak supply voltage	V_{CC} peak	See below pulse wave.	50	V
Operating ambient temperature	T_{opr}		-40 to +85	°C
Storage temperature	T_{stg}		-55 to +150	°C
Junction temperature	T_j max		150	°C

■ Any and all SANYO Semiconductor Co.,Ltd. products described or contained herein are, with regard to "standard application", intended for the use as general electronics equipment. The products mentioned herein shall not be intended for use for any "special application" (medical equipment whose purpose is to sustain life, aerospace instrument, nuclear control device, burning appliances, transportation machine, traffic signal system, safety equipment etc.) that shall require extremely high level of reliability and can directly threaten human lives in case of failure or malfunction of the product or may cause harm to human bodies, nor shall they grant any guarantee thereof. If you should intend to use our products for new introduction or other application different from current conditions on the usage of automotive device, communication device, office equipment, industrial equipment etc. , please consult with us about usage condition (temperature, operation time etc.) prior to the intended use. If there is no consultation or inquiry before the intended use, our customer shall be solely responsible for the use.

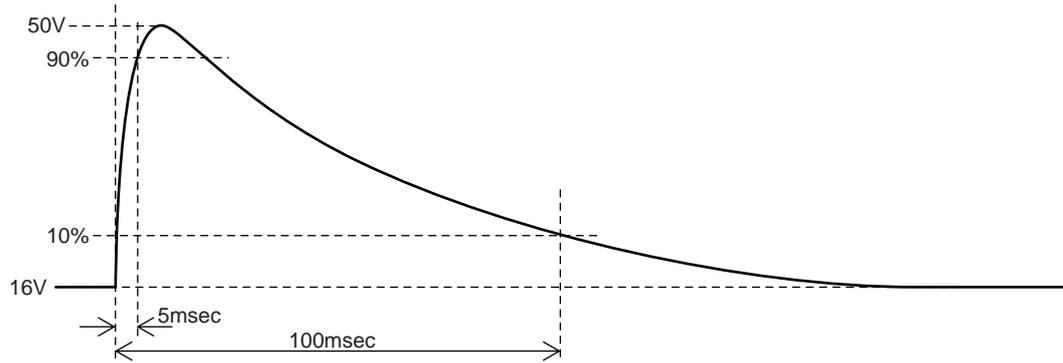
■ Specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

SANYO Semiconductor Co., Ltd.

<http://semicon.sanyo.com/en/network>

LV5683P

Peak voltage testing pulse wave



Recommended Operating condition at $T_a = 25^\circ\text{C}$

Parameter	Conditions	Ratings	Unit
Power supply voltage rating 1	V_{DD} output(5V/3.3V)	7 to 16	V
Power supply voltage rating 2	USB(5V) output, SWU output: $V_{CC}=V_{CC1}$	7.5 to 16	V
Power supply voltage rating 3	AUDIO output	10 to 16	V
Power supply voltage rating 4	USB(8V) output: $V_{CC}=V_{CC1}$	10.5 to 16	V

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = V_{CC1} = 14.4\text{V}$ (*1)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	I_{CC}	V_{DD} no load, ALL EN terminal = [L]		50	100	μA
AUDIO_EN Input						
Low input voltage	V_{IL1}		0		0.5	V
High input voltage	V_{IH1}		2.8		5.5	V
Input impedance	R_{IH1}		280	400	520	$\text{k}\Omega$
SWU_EN Input						
Low input voltage	V_{IL2}		0		0.5	V
High input voltage	V_{IH2}		2.8		5.5	V
Input impedance	R_{IH2}		280	400	520	$\text{k}\Omega$
USB_EN input						
Low input voltage	V_{IL3}		0		0.5	V
High input voltage	V_{IH3}		2.8		5.5	V
Input impedance	R_{IH3}		280	400	520	$\text{k}\Omega$
V_{DD} (5V/3.3V)output(reverse current prevention diode implemented)						
V_{DD} output voltage 1	V_{O11}	$I_{O11} = 200\text{mA}$, $IKV_{DD}=\text{OPEN}$, or $V_{DD}\text{out}$	4.75	5.0	5.25	V
V_{DD} output current 1	I_{O11}	$V_{O11} \geq 4.7\text{V}$	300			mA
V_{DD} output voltage 2	V_{O12}	$I_{O12} = 200\text{mA}$, $IKV_{DD}=\text{GND}$	3.13	3.3	3.47	V
V_{DD} output current 2	I_{O12}	$V_{O12} \geq 3.1\text{V}$	300			mA
Line regulation	ΔV_{OLN1}	$7\text{V} < V_{CC} < 16\text{V}$, $I_{O1} = 200\text{mA}$		50	100	mV
Load regulation	ΔV_{OLD1}	$1\text{mA} < I_{O11}$, $I_{O12} < 200\text{mA}$		80	150	mV
Dropout voltage 1	V_{DROP1}	$I_{O1} = 200\text{mA}$ (implemented diode)		1.5	2.5	V
V_{CC} ripple rejection	R_{REJ1}	$f=120\text{Hz}$, $V_{CC}=1\text{V}_{PP}$, $I_{O1}=200\text{mA}$	40(*2)	50(*2)		dB
V_{DD} reverse current	I_{REV}	$V_{O11}=5.0\text{V}$, $V_{CC}=0\text{V}$		10	100	μA
USB/CD output ; USB_EN = High						
USB output voltage 1	V_{O21}	$I_{O21} = 200\text{mA}$, $IK_{USB}=\text{OPEN}$, or $USB\text{out}$	7.6	8.0	8.4	V
USB output current 1	I_{O21}	$V_{O21} \geq 7.45\text{V}$	1100			mA
USB output voltage 2	V_{O22}	$I_{O22} = 1000\text{mA}$, $IK_{USB}=\text{GND}$	4.75	5.0	5.25	V
USB output current 2	I_{O22}	$V_{O22} \geq 4.6\text{V}$	1100			mA
Line regulation	ΔV_{OLN2}	$10.5\text{V} < V_{CC1} < 16\text{V}$, $I_{O2} = 1000\text{mA}$		50	100	mV
Load regulation	ΔV_{OLD2}	$10\text{mA} < I_{O21}$, $I_{O22} < 1000\text{mA}$		100	200	mV
Dropout voltage 1	V_{DROP2}	I_{O21} , $I_{O22} = 1000\text{mA}$		1.0	2.0	V
V_{CC1} ripple rejection	R_{REJ2}	$f=120\text{Hz}$, $V_{CC1}=1\text{V}_{PP}$, $I_{O2}=1000\text{mA}$	40(*2)	50(*2)		dB

Continued on next page.

LV5683P

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
AUDIO output ; AUDIO_EN = High						
AUDIO output voltage	V_{O3}	$I_{O3} = 200\text{mA}$	8.1	8.5	8.9	V
AUDIO output current	I_{O3}	$V_{O3} \geq 8\text{V}$	300			μA
Line regulation	ΔV_{OLN3}	$10\text{V} < V_{CC} < 16\text{V}$, $I_{O3} = 200\text{mA}$		30	100	mV
Load regulation	ΔV_{OLD3}	$1\text{mA} < I_{O3} < 200\text{mA}$		70	140	mV
Dropout voltage	V_{DROP3}	$I_{O3} = 200\text{mA}$		0.4	0.7	V
V_{CC} ripple rejection	R_{REJ3}	$f = 120\text{Hz}$, $V_{CC} = 1\text{V}_{PP}$, $I_{O3} = 200\text{mA}$	40(*2)	50(*2)		dB
SWU (3.3V) Output ; SEU_EN = High						
ILM output voltage	V_{O4}	$I_{O4} = 400\text{mA}$	3.13	3.3	3.47	V
ILM output current	I_{O4}	$V_{O4} \geq 3.1\text{V}$	500			mA
Line regulation	ΔV_{OLN4}	$7.5\text{V} < V_{CC1} < 16\text{V}$, $I_{O4} = 400\text{mA}$		30	100	mV
Load regulation	ΔV_{OLD4}	$1\text{mA} < I_{O4} < 400\text{mA}$		80	150	mV
V_{CC1} ripple rejection	R_{REJ4}	$f = 120\text{Hz}$, $V_{CC1} = 1\text{V}_{PP}$, $I_{O4} = 400\text{mA}$	40(*2)	50(*2)		dB

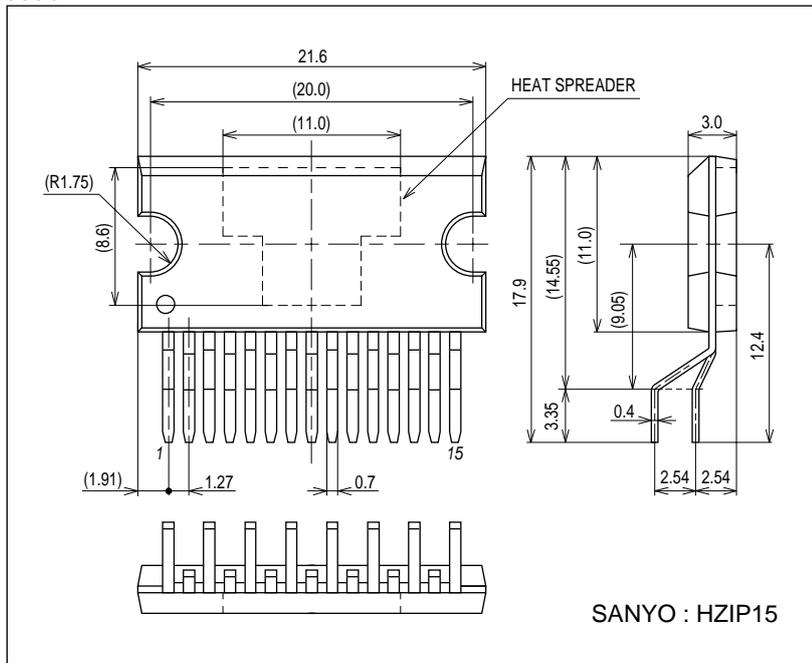
*1: The entire specification has been defined based on the tests performed under the conditions where T_j and $T_a (=25^\circ\text{C})$ are almost equal. These tests were performed with pulse load to minimize the increase of junction temperature(T_j).

*2: design certification

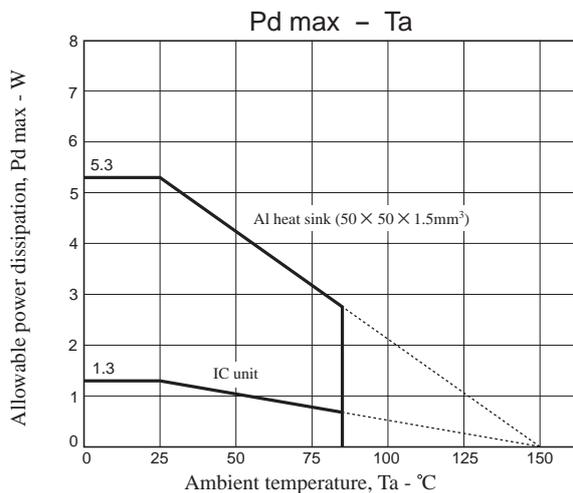
Package Dimensions

unit : mm (typ)

3336



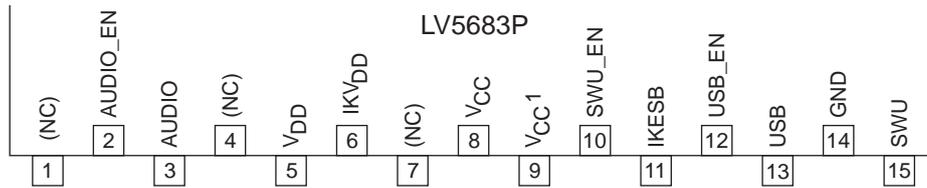
Allowable power dissipation derating curve



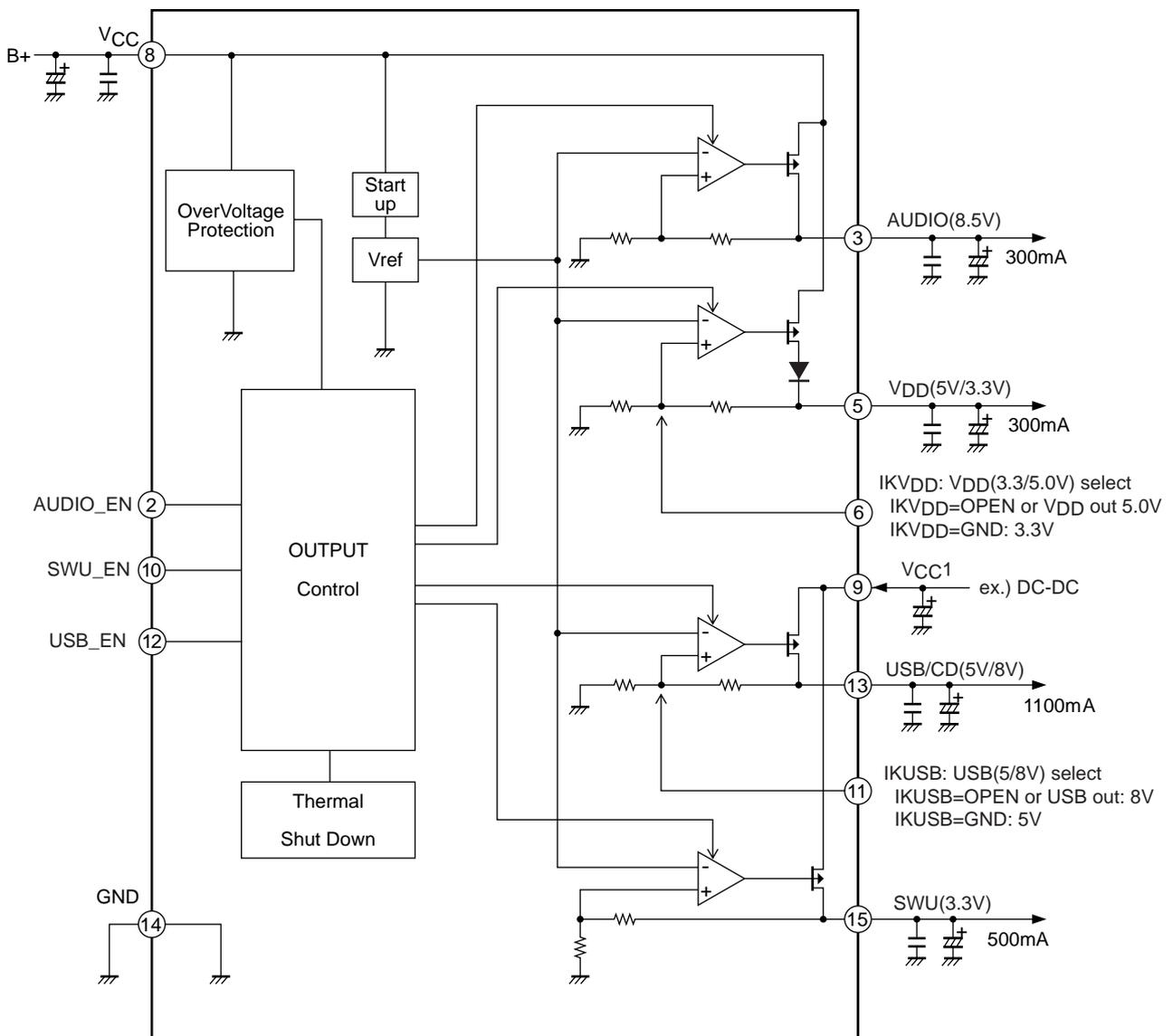
- (a) IC unit(HZIP15)
- (b) With Al heatsink($50 \times 50 \times 1.5\text{mm}^3$)
Al heatsink mounting conditions
Tightening torque: 39N-cm, using silicone grease

LV5683P

Pin assignment



Block Diagram



LV5683P

Pin Function

Pin No.	Pin name	Description	Equivalent Circuit
1	N.C.	-	-
2	AUDIO_EN	AUDIO output CTRL	
3	AUDIO	AUDIO output when AUDIO_EN = High, ON 8.5V/0.3A	
4	N.C.	-	-
5	V _{DD}	V _{DD} output 5.0V, 3.3V/0.3A	
6	IKV _{DD}	V _{DD} output voltage select OPEN : V _{DD} = 5.0V GND : V _{DD} = 3.3V	
7	N.C.	-	-
8	V _{CC}	V _{CC}	
9	V _{CC1}	V _{CC1}	

Continued on next page.

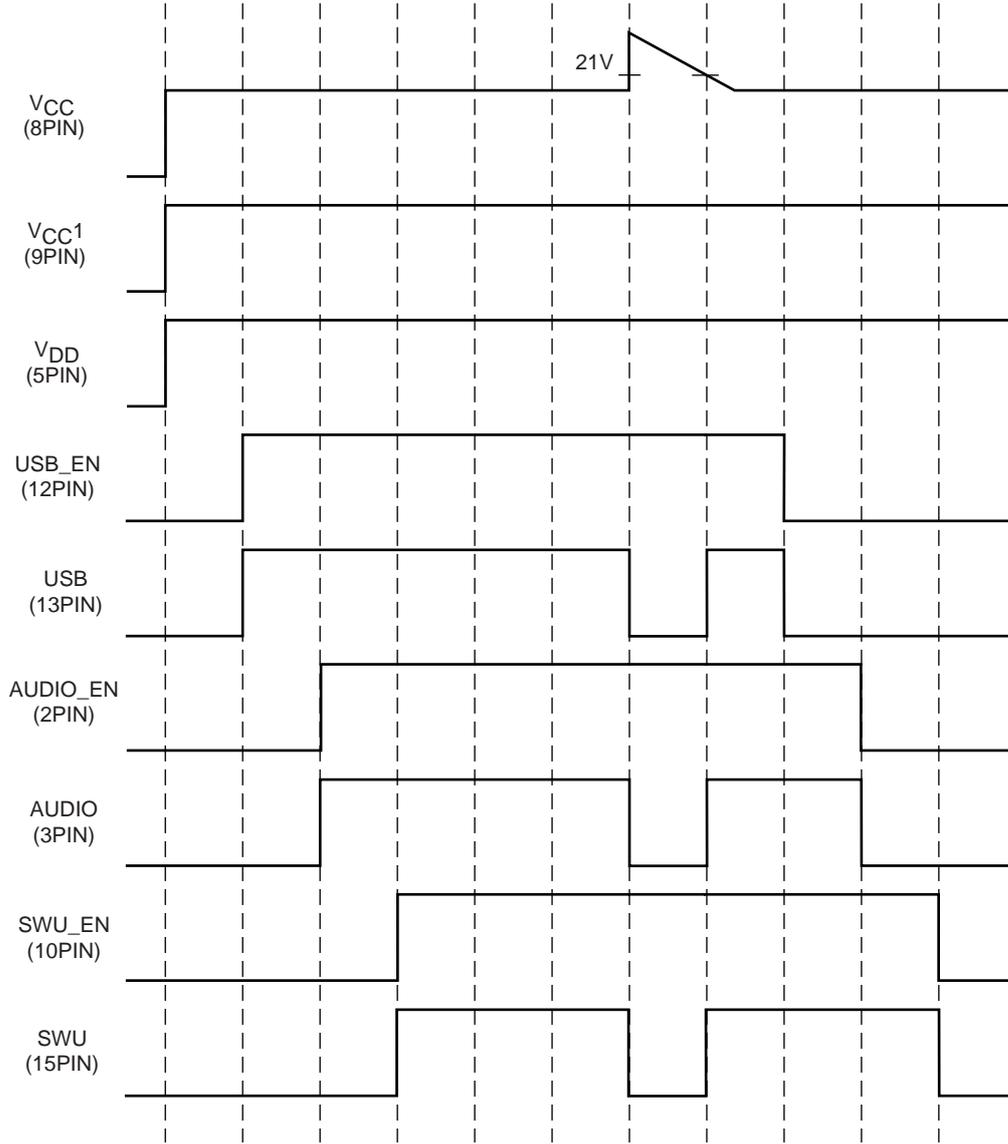
LV5683P

Continued from preceding page.

Pin No.	Pin name	Description	Equivalent Circuit
10	SWU_EN	SWU output CTRL	
11	IKUSB	USB output voltage select OPEN : $V_{DD} = 8.0V$ GND : $V_{DD} = 5.0V$	
12	USB_EN	USB output CTRL	
13	USB	USB output when USB_EN = High, ON 5.0V, 8.0V/1.1A	
14	GND	GND	
15	SWU	SWU output when SWU_EN = High, ON 3.3V/0.5A	

LV5683P

Timing Chart



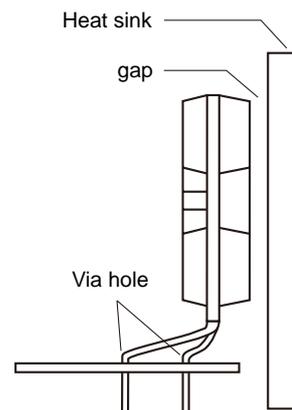
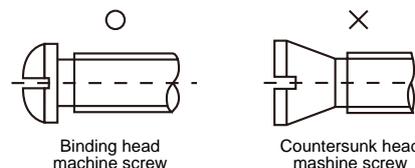
HZIP15 Heat sink attachment

Heat sinks are used to lower the semiconductor device junction temperature by leading the heat generated by the device to the outer environment and dissipating that heat.

- a. Unless otherwise specified, for power ICs with tabs and power ICs with attached heat sinks, solder must not be applied to the heat sink or tabs.

b. Heat sink attachment

- Use flat-head screws to attach heat sinks.
- Use also washer to protect the package.
- Use tightening torques in the ranges 39-59Ncm(4-6kgcm) .
- If tapping screws are used, do not use screws with a diameter larger than the holes in the semiconductor device itself.
- Do not make gap, dust, or other contaminants to get between the semiconductor device and the tab or heat sink.
- Take care a position of via hole .
- Do not allow dirt, dust, or other contaminants to get between the semiconductor device and the tab or heat sink.
- Verify that there are no press burrs or screw-hole burrs on the heat sink.
- Warping in heat sinks and printed circuit boards must be no more than 0.05 mm between screw holes, for either concave or convex warping.
- Twisting must be limited to under 0.05 mm.
- Heat sink and semiconductor device are mounted in parallel.
Take care of electric or compressed air drivers
- The speed of these torque wrenches should never exceed 700 rpm, and should typically be about 400 rpm.



c. Silicone grease

- Spread the silicone grease evenly when mounting heat sinks.
- Sanyo recommends YG-6260 (Momentive Performance Materials Japan LLC)

d. Mount

- First mount the heat sink on the semiconductor device, and then mount that assembly on the printed circuit board.
- When attaching a heat sink after mounting a semiconductor device into the printed circuit board, when tightening up a heat sink with the screw, the mechanical stress which is impossible to the semiconductor device and the pin doesn't hang.

e. When mounting the semiconductor device to the heat sink using jigs, etc.,

- Take care not to allow the device to ride onto the jig or positioning dowel.
- Design the jig so that no unreasonable mechanical stress is not applied to the semiconductor device.

f. Heat sink screw holes

- Be sure that chamfering and shear drop of heat sinks must not be larger than the diameter of screw head used.
- When using nuts, do not make the heat sink hole diameters larger than the diameter of the head of the screws used. A hole diameter about 15% larger than the diameter of the screw is desirable.
- When tap screws are used, be sure that the diameter of the holes in the heat sink are not too small. A diameter about 15% smaller than the diameter of the screw is desirable.

- g. There is a method to mount the semiconductor device to the heat sink by using a spring band. But this method is not recommended because of possible displacement due to fluctuation of the spring force with time or vibration.

- SANYO Semiconductor Co.,Ltd. assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO Semiconductor Co.,Ltd. products described or contained herein.
- SANYO Semiconductor Co.,Ltd. strives to supply high-quality high-reliability products, however, any and all semiconductor products fail or malfunction with some probability. It is possible that these probabilistic failures or malfunction could give rise to accidents or events that could endanger human lives, trouble that could give rise to smoke or fire, or accidents that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO Semiconductor Co.,Ltd. products described or contained herein are controlled under any of applicable local export control laws and regulations, such products may require the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written consent of SANYO Semiconductor Co.,Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO Semiconductor Co.,Ltd. product that you intend to use.
- Upon using the technical information or products described herein, neither warranty nor license shall be granted with regard to intellectual property rights or any other rights of SANYO Semiconductor Co.,Ltd. or any third party. SANYO Semiconductor Co.,Ltd. shall not be liable for any claim or suits with regard to a third party's intellectual property rights which has resulted from the use of the technical information and products mentioned above.

This catalog provides information as of October, 2011. Specifications and information herein are subject to change without notice.

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: org@lifeelectronics.ru