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LV56841PVD

Bi-CDMOS LSI

For Car Audio Systems Multi-Power Supply IC

Overview

The LV56841PVD is a power supply IC suitable for CD receiver system for car audio system.

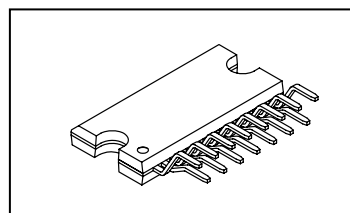
This IC integrates 5 systems of regulator output, 2 systems of high side power switch, over-current protector, overvoltage protector and over-heat protector .

Supply for SW33V outputs is low voltage specification, which enables drastic reduction of power dissipation compared to the existing model. (the package is HZIP15).

Function

- Low consumption current: 50 μ A (typ, only V_{DD} output is in operation)
- 5 systems of regulator output
 - V_{DD} for microcontroller: output voltage: 3.3V, maximum output current: 350mA
 - Reverse current protection implemented.
 - For system: output voltage: 3.3V, maximum output current: 350mA
 - For audio: output voltage: 5 to 12V (set by external resistors), maximum output current: 300mA
 - For illumination: output voltage: 5 to 12V (set by external resistors), maximum output current: 300mA
 - For CD: output voltage: 6V, maximum output current: 1500mA
- 2 lines of high side switch with interlock V_{CC}
 - EXT: Maximum output current: 500mA, voltage difference between input and output: 0.75V
 - ANT: Maximum output current: 300mA, voltage difference between input and output: 0.5V
- Supply input
 - V_{6IN}: 6V for system (SW33V)
 - V_{CC1}: For internal reference voltage, control circuits, and V_{DD} output.
 - V_{CC2}: For AUDIO, illumination, CD, EXT/ANT
- Over-current protector
- Overvoltage protector(OVP): V_{CC1}, V_{CC2} Typ 21V (All outputs except V_{DD} are turned off)
- Overvoltage shutdown(OVS): V_{6IN} Typ 21V (All outputs except V_{DD} are turned off)
- Overheat protector: Typ 175°C
- Pch-LDMOS is used in power output block

(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 over-current protection range, thermal shutdown state or V_{6IN} OVS condition may degrade the IC's reliability and eventually damage the IC.



HZIP15

ORDERING INFORMATION

See detailed ordering and shipping information on page 15 of this data sheet.

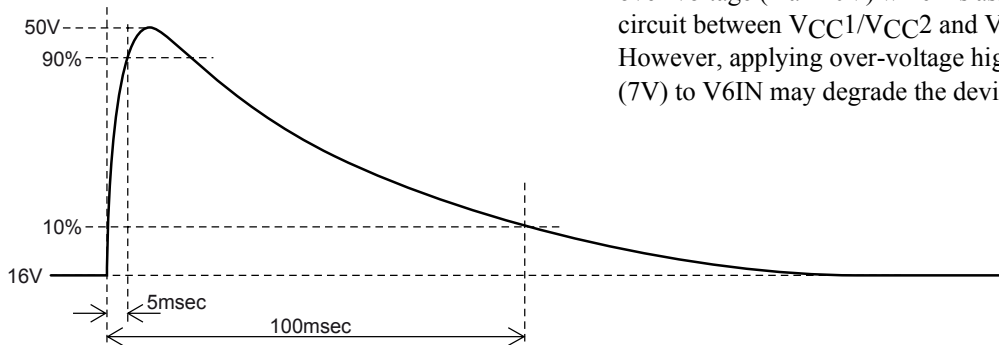
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Absolute Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit | |
|-------------------------------|----------------------|--------------------------------------|-------------|------|---|
| Supply voltage | V _{CC} max | V _{CC} 1, V _{CC} 2 | 36 | V | |
| | V6IN max | V6IN (*) | 7 | V | |
| Input voltage | V _{IN} max | CTRL1, CTRL2 | 7 | V | |
| Allowable power dissipation | Pd max | -Independent IC | Ta ≤ 25°C | 1.3 | W |
| | | Al heat sink * | | 5.3 | W |
| | | -Size of heatsink: infinite | | 26 | W |
| Peak supply voltage | V _{CC} peak | See the appendix for waveform. | 50 | V | |
| Operating ambient temperature | Topr | | -40 to +85 | °C | |
| Storage temperature | Tstg | | -55 to +150 | °C | |
| Junction temperature | Tj max | | 150 | °C | |

* : When the Aluminum heat sink (50mm × 50mm × 1.5mm) is used

Waveform of surge test (V_{CC}1, V_{CC}2)



*V6IN is designed to tolerant toward short period of over-voltage (max 20V) which is assumed in condition of short circuit between V_{CC}1/V_{CC}2 and V6IN. However, applying over-voltage higher than maximum rating (7V) to V6IN may degrade the device reliability

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Recommended Operating range at Ta = 25°C

V_{CC}1

| Parameter | Conditions | Ratings | Unit |
|----------------------------|------------------------|---------|------|
| Operating supply voltage 1 | V _{DD} output | 7 to 16 | V |

V_{CC}2

| Parameter | Conditions | Ratings | Unit |
|----------------------------|-----------------------------------|------------|------|
| Operating supply voltage 2 | ILM output (10V) | 12 to 16 | V |
| | ILM output (8V) | 10 to 16 | V |
| Operating supply voltage 3 | AUDIO output (9V) | 10 to 16 | V |
| | AUDIO output (5V) | 8 to 16 | V |
| Operating supply voltage 4 | CD output (I _O = 1.3A) | 10.5 to 16 | V |
| | CD output (I _O ≤ 1A) | 10 to 16 | V |
| Operating supply voltage 5 | EXT output, ANT output | 10 to 16 | V |

V6IN

| Parameter | Conditions | Ratings | Unit |
|----------------------------|--------------|------------|------|
| Operating supply voltage 6 | SW33V output | 5.5 to 6.5 | V |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

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Electrical Characteristics : $V_{CC1} = V_{CC2} = 14.4V$, $V_{6IN} = 6V$ at $T_a = 25^\circ C$ (*1)

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|-------------------|--|---------|------|-------|-----------|
| | | | min | typ | max | |
| Quiescent current | I_{CC} | V_{DD} w/out load, CTRL1/2 = "L/L" | | 50 | 100 | μA |
| CTRL1 input (ANT/EXT/ILM) | | | | | | |
| Low input voltage | V_{IL1} | | 0 | | 0.5 | V |
| M1 input voltage | V_{IM1} | | 0.8 | 1.1 | 1.4 | V |
| M2 input voltage | V_{IM2} | | 1.9 | 2.2 | 2.5 | V |
| High input voltage | V_{IH1} | | 2.9 | 3.3 | 5.5 | V |
| Input impedance | R_{IN1} | input voltage $\leq 3.3V$ | 280 | 400 | 480 | $k\Omega$ |
| CTRL2 input (CD/AUDIO/SW33V) | | | | | | |
| Low input voltage | V_{IL2} | | 0 | | 0.5 | V |
| M1 input voltage | V_{IM12} | | 0.8 | 1.1 | 1.4 | V |
| M2 input voltage | V_{IM22} | | 1.9 | 2.2 | 2.5 | V |
| High input voltage | V_{IH2} | | 2.9 | 3.3 | 5.5 | V |
| Input impedance | R_{IN2} | input voltage $\leq 3.3V$ | 280 | 400 | 480 | $k\Omega$ |
| V_{DD} output (3.3V) (reverse current prevention diode implemented) | | | | | | |
| Output voltage | V_{O1} | $I_{O1} = 200mA$ | 3.13 | 3.3 | 3.47 | V |
| Output current | I_{O1} | $V_{O1} \geq 3.1V$ | 350 | | | mA |
| Line regulation | ΔV_{OLN1} | $7.5V < V_{CC1} < 16V$, $I_{O1} = 200mA$ | | 30 | 90 | mV |
| Load regulation | ΔV_{OLD1} | $1mA < I_{O1} < 200mA$ | | 70 | 150 | mV |
| Dropout voltage1 | V_{DROP11} | $I_{O1} = 100mA$ | | 2.6 | 3.1 | V |
| Dropout voltage2 | V_{DROP12} | $I_{O1} = 200mA$ | | 2.8 | 3.5 | V |
| Ripple rejection (*2) | R_{REJ1} | $f = 120Hz$, $V_{CC1} = 0.5V_{pp}$ $I_{O1} = 200mA$ | 40 | 50 | | dB |
| Reverse current | I_{rev} | $V_{O1} = 3.3V$, $V_{CC1} = V_{6IN} = 0V$ | | 1 | 50 | μA |
| SW33V output (3.3V) ; CTRL2 = "M2 or H" | | | | | | |
| Output voltage | V_{O2} | $I_{O2} = 200mA$ | 3.13 | 3.3 | 3.47 | V |
| Output current | I_{O2} | $V_{O2} \geq 3.1V$ | 350 | | | mA |
| Line regulation | ΔV_{OLN2} | $5.7V < V_{6IN} < 6.5V$, $I_{O2} = 200mA$ | | 30 | 90 | mV |
| Load regulation | ΔV_{OLD2} | $1mA < I_{O2} < 200mA$ | | 70 | 150 | mV |
| Dropout voltage | V_{DROP2} | $I_{O2} = 200mA$ | | 0.25 | 0.5 | V |
| Ripple rejection (*2) | R_{REJ2} | $f = 120Hz$, V_{6IN} or $V_{CC1} = 0.5V_{pp}$ $I_{O2} = 200mA$ | 40 | 50 | | dB |
| AUDIO (5-12V)output ; CTRL2 = "H" | | | | | | |
| AUDIO_F voltage | V_{I3} | | 1.212 | 1.25 | 1.288 | V |
| AUDIO_F input current | I_{IN3} | | -1 | | 1 | μA |
| AUDIO output voltage 1 | V_{O3} | $I_{O3} = 200mA$, $R_3 = 30k\Omega$, $R_4 = 5.6k\Omega$ (*3) | 7.65 | 8.0 | 8.35 | V |
| AUDIO output voltage 2 | $V_{O3'}$ | $I_{O3} = 200mA$, $R_3 = 27k\Omega$, $R_4 = 4.7k\Omega$ (*3) | 8.13 | 8.5 | 8.87 | V |
| AUDIO output voltage 3 | $V_{O3''}$ | $I_{O3} = 200mA$, $R_3 = 24k\Omega$, $R_4 = 3.9k\Omega$ (*3) | 8.6 | 9.0 | 9.4 | V |
| AUDIO output voltage 4 | $V_{O3'''}$ | $I_{O3} = 200mA$, $R_3 = 30k\Omega$, $R_4 = 10k\Omega$ (*3) | 4.75 | 5.0 | 5.25 | V |
| AUDIO output current | I_{O3} | | 300 | | | mA |
| Line regulation | ΔV_{OLN3} | $10V < V_{CC2} < 16V$, $I_{O3} = 200mA$ | | 30 | 90 | mV |
| Load regulation | ΔV_{OLD3} | $1mA < I_{O3} < 200mA$ | | 70 | 150 | mV |
| Dropout voltage 1 | V_{DROP3} | $I_{O3} = 200mA$ | | 0.4 | 0.6 | V |
| Ripple rejection (*2) | R_{REJ3} | $f = 120Hz$, $I_{O3} = 200mA$ | 40 | 50 | | dB |
| ILM (5-12V) output ; CTRL2 = "M1 or H" | | | | | | |
| ILM_F voltage | V_{I4} | | 1.212 | 1.25 | 1.288 | V |
| ILM_F input current | I_{IN4} | | -1 | | 1 | μA |
| ILM output voltage 1 | V_{O4} | $I_{O4} = 200mA$, $R_1 = 43k\Omega$, $R_2 = 5.1k\Omega$ (*3) | 11.21 | 11.8 | 12.39 | V |
| ILM output voltage 2 | $V_{O4'}$ | $I_{O4} = 200mA$, $R_1 = 56k\Omega$, $R_2 = 7.5k\Omega$ (*3) | 9.97 | 10.5 | 11.03 | V |
| ILM output voltage 3 | $V_{O4''}$ | $I_{O4} = 200mA$, $R_1 = 30k\Omega$, $R_2 = 5.6k\Omega$ (*3) | 7.6 | 8.0 | 8.4 | V |
| ILM output voltage 4 | $V_{O4'''}$ | $I_{O4} = 200mA$, $R_1 = 30k\Omega$, $R_2 = 10k\Omega$ (*3) | 4.75 | 5.0 | 5.25 | V |
| ILM output current | I_{O4} | | 300 | | | mA |

Continued on next page.

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Continued from preceding page.

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|-------------------|--|---------------|----------------|------|------|
| | | | min | typ | max | |
| Line regulation | ΔV_{OLN4} | $10V < V_{CC2} < 16V, I_{O4} = 200mA$ $R1 = 30k\Omega, R2 = 5.6k\Omega$ | | 30 | 90 | mV |
| Load regulation | ΔV_{OLD4} | $1mA < I_{O4} < 200mA$ | | 70 | 150 | mV |
| Dropout voltage 1 | V_{DROP4} | $I_{O4} = 200mA$ | | 0.7 | 1.05 | V |
| Dropout voltage 2 | V_{DROP4}' | $I_{O4} = 100mA$ | | 0.35 | 0.53 | V |
| Ripple rejection (*2) | R_{REJ4} | $f = 120Hz, I_{O4} = 200mA$ | 40 | 50 | | dB |
| CD (6V output) ; CTRL2 = "M1 or M2 or H" | | | | | | |
| Output voltage | V_{O5} | $I_{O5} = 1000mA$ | 5.7 | 6.0 | 6.3 | V |
| Output current | I_{O5} | $V_{O5} \geq 5.6V$ | 1500 | | | mA |
| Limit current(*4) | I_{lim5} | $V_{O5} \geq 5.5V$ | 1700 | | | mA |
| Line regulation | ΔV_{OLN5} | $10.5V < V_{CC2} < 16V, I_{O5} = 1000mA$ | | 50 | 100 | mV |
| Load regulation | ΔV_{OLD5} | $10mA < I_{O5} < 1000mA$ | | 100 | 200 | mV |
| Dropout voltage 1 | V_{DROP5} | $I_{O5} = 1000mA$ | | 1.0 | 1.5 | V |
| Dropout voltage 2 | V_{DROP5}' | $I_{O5} = 500mA$ | | 0.5 | 0.75 | V |
| Ripple rejection (*2) | R_{REJ5} | $f = 120Hz, I_{O5} = 1000mA$ | 40 | 50 | | dB |
| EXT_HS-SW ; CTRL1 = "M1 or M2 or H" | | | | | | |
| Output voltage | V_{O6} | $I_{O6} = 500mA$ | $V_{CC2-2.5}$ | $V_{CC2-0.75}$ | | V |
| Output current | I_{O6} | $V_{O6} \geq V_{CC2-2.5}$ | 500 | | | mA |
| ANT_HS-SW ; CTRL1 = "H" | | | | | | |
| Output voltage | V_{O7} | $I_{O7} = 300mA$ | $V_{CC2-1.0}$ | $V_{CC2-0.5}$ | | V |
| Output current | I_{O7} | $V_{O7} \geq V_{CC2-1.0}$ | 300 | | | mA |

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

*2 : guaranteed by design

*3 : Using resistors of tolerance within 1%.

*4 : When the output current is over " I_{lim5} ", the over-current protector circuit operates. The over-current protector circuit is "fold-back" type, and it limits the output current and voltage when it's operating. The output current should be usually limited below I_{omax} that is "min of I_{O5} ".

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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CTRL logic truth table

| CTRL1 | ANT | ILM | EXT |
|-------|-----|-----|-----|
| H | ON | ON | ON |
| M2 | ON | OFF | ON |
| M1 | OFF | ON | ON |
| L | OFF | OFF | OFF |

| CTRL2 | AUDIO | SW33V | CD |
|-------|-------|-------|-----|
| H | ON | ON | ON |
| M2 | OFF | ON | ON |
| M1 | OFF | OFF | ON |
| L | OFF | OFF | OFF |

(Warning) Usage of CTRL pin

When CTRL pin transits between L and M2, since it passes M1, ILM is turned on for a moment. Likewise, when CTRL pin transits between H and M1, since it passes M2, ILM is turned off for a moment.

To avoid operation failure by the above factors, please refer (1) and (2) as shown below for precaution.dd

- Do not connect parasitic capacitor to CTRL as much as possible.
- If use of capacitor for CTRL is required, keep the resistance value as low as possible.
- Make sure that the output load capacitor has enough margin against the voltage fluctuation due to instantaneous ON/OFF.

(1) The time until a reaction occurs in output after from CTRL ON to OFF (typ)

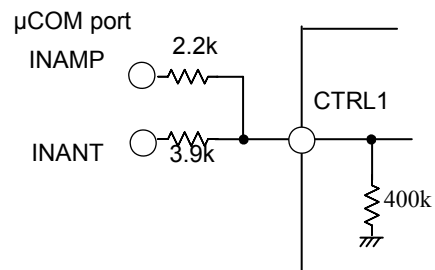
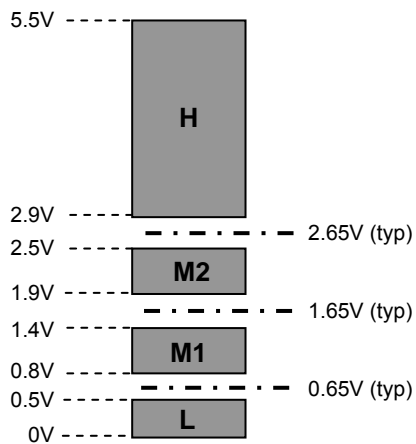
| | |
|-------------|---------|
| OFF→ON time | 27°C |
| CTRL1→ILM | 6.0μsec |

Due to quality fluctuation of ICs in manufacturing process, the above-mentioned time can be shorted by 10 to 20%.

(2)The time until output starts to react shifting from CTRL ON→OFF control :

| | |
|-------------|---------|
| ON→OFF time | 27°C |
| CTRL1→ILM | 2.3μsec |

CTRL1/2 voltage range and threshold

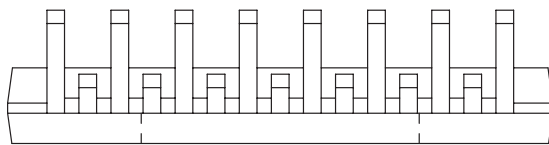
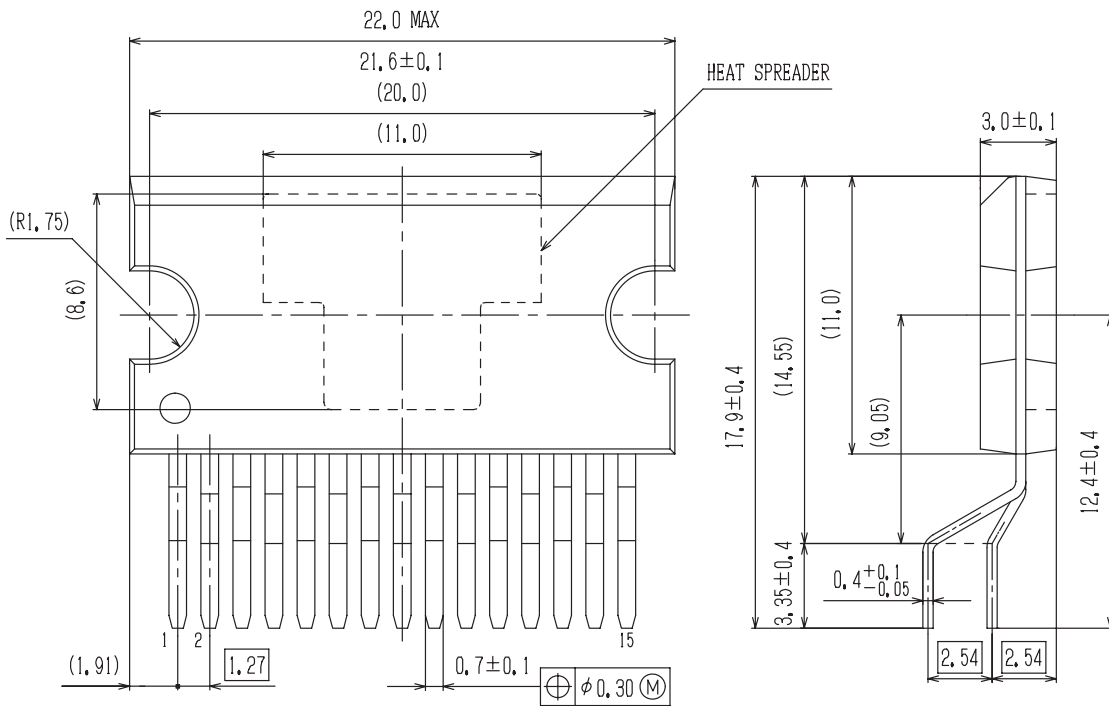


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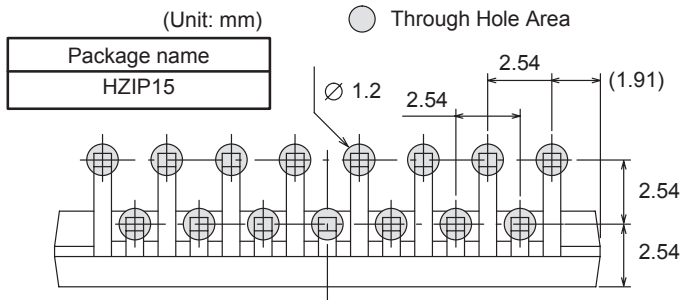
Package Dimensions

unit : mm (typ)

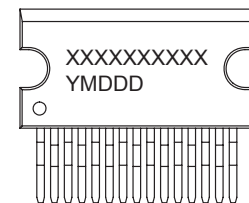
HZIP15
CASE 945AB
ISSUE A



SOLDERING FOOTPRINT*



GENERIC MARKING DIAGRAM*



XXXXX = Specific Device Code
Y = Year
M = Month
DDD = Additional Traceability Data

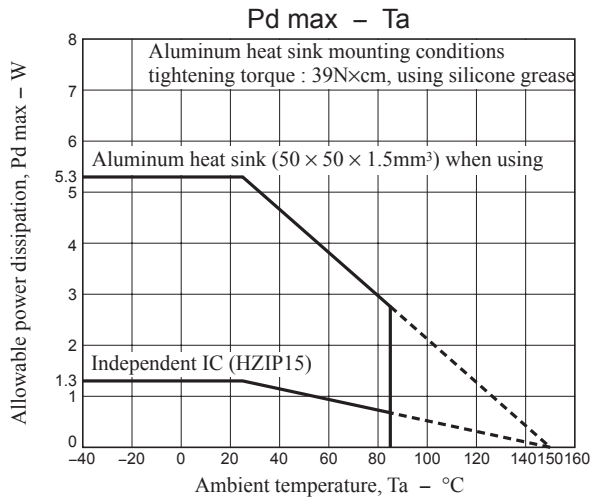
*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

NOTE: The measurements are not to guarantee but for reference only.

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

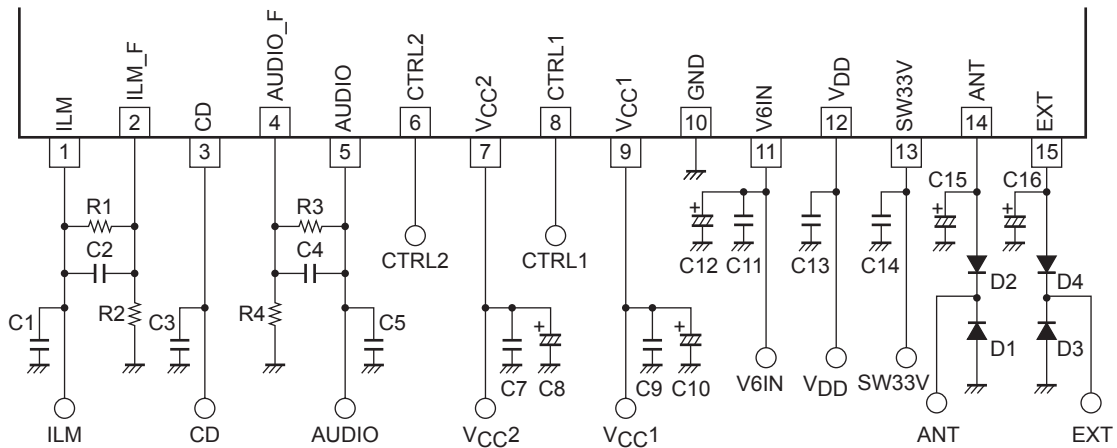
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- Allowable power dissipation derating curve



Application Circuit Example

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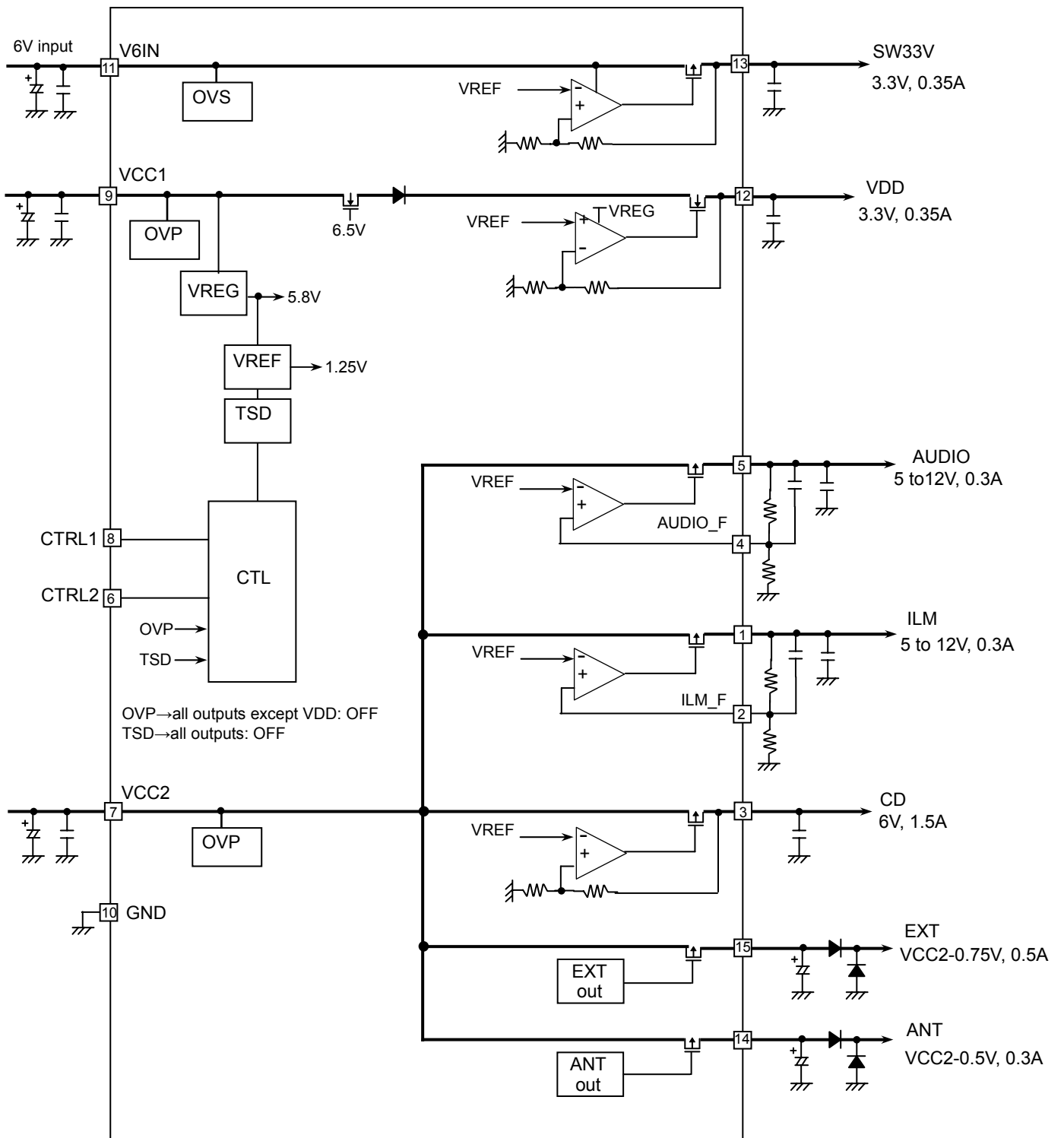
Peripheral parts

| Part name | Description | Recommended value | Note |
|----------------------|--|--|--|
| C1, C3, C5, C13, C14 | output stabilization capacitor | greater than 10μF (*1) | |
| C2, C4 | output stabilization capacitor | 0pF | Ceramic capacitor |
| C8, C10, C12 | Capacitor for bypass power supply | C8: greater than 100μF C10, C12: greater than 47μF | Make sure to implement close to V _{CC} and GND. |
| C7, C9, C11 | Capacitor for oscillation protector | greater than 0.22μF | |
| C15, C16 | Capacitor for EXT/ANT output stabilization | greater than 2.2μF | |
| R1, R2 | ILM voltage setting | R1/R2 43kΩ/5.1kΩ : V _O = 12V 56kΩ/7.5kΩ : V _O = 10.5V 30kΩ/5.6kΩ : V _O = 8V 30kΩ/10kΩ : V _O = 5V | Use resistors of tolerance within 1% |
| R3, R4 | AUDIO voltage setting | R3/R4 30kΩ/10kΩ : V _O = 5V 30kΩ/5.6kΩ : V _O = 8.0V 27kΩ/4.7kΩ : V _O = 8.5V 24kΩ/3.9kΩ : V _O = 9V | Use resistors of tolerance within 1% |
| D1, D2, D3, D4 | Internal device protector diode | ON Semiconductor SB1003M3 | |

(*1) Make sure that output capacitors are greater than 10μF and meets the condition of ESR = 0.001 to 10Ω, in which voltage/ temperature dependence and unit differences are taken into consideration. Moreover, in case of electrolytic capacitor, high-frequency characteristics should be sufficiently good.

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Block Diagram



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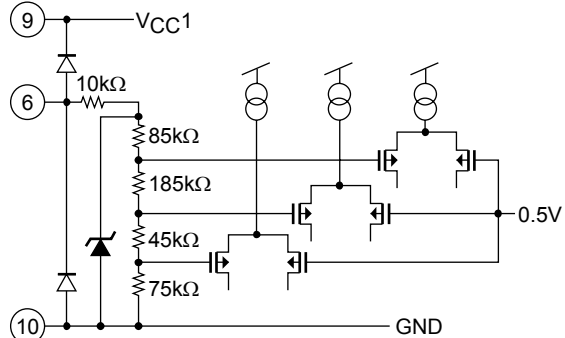
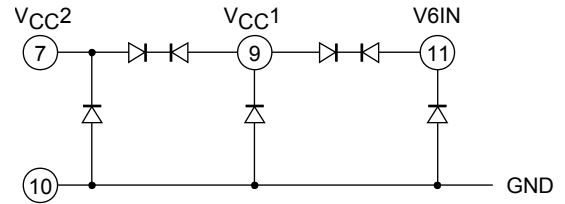
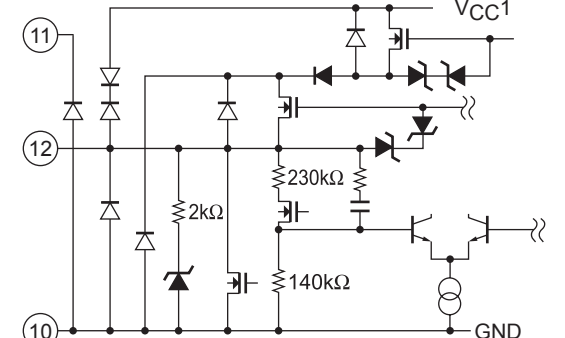
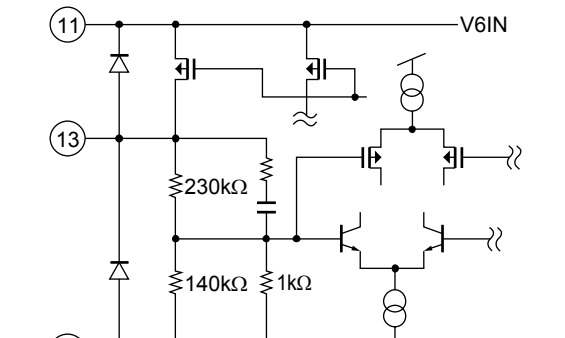
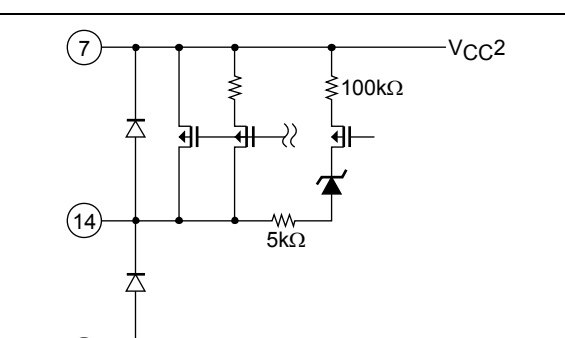
Pin Function

| Pin No. | Pin name | Description | Equivalent Circuit |
|---------|----------|---|--------------------|
| 1 | ILM | ILM output When CTRL1 = M1, H, ILM is ON | |
| 2 | ILM_F | ILM voltage adjust | |
| 3 | CD | CD output When CTRL2 = M1, M2, H, CD is ON 6V/1.5A | |
| 4 | AUDIO_F | AUDIO voltage adjust | |
| 5 | AUDIO | AUDIO output When CTRL2 = H AUDIO is ON | |
| 6 | CTRL2 | CTRL2 input 4-value input | |
| 7 | VCC2 | Power supply | |

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| Pin No. | Pin name | Description | Equivalent Circuit |
|---------|----------|---|--|
| 8 | CTRL1 | CTRL1 input 4-value input |  |
| 9 | VCC1 | Power supply |  |
| 10 | GND | GND | |
| 11 | V6IN | Power supply | |
| 12 | VDD | VDD output 3.3V/0.35A |  |
| 13 | SW33V | SW33V output When CTRL2 = M2, H SW33V is ON 3.3V/0.35A |  |
| 14 | ANT | ANT output When CTRL1 = M2, H ANT is ON VCC=0.5V/300mA |  |

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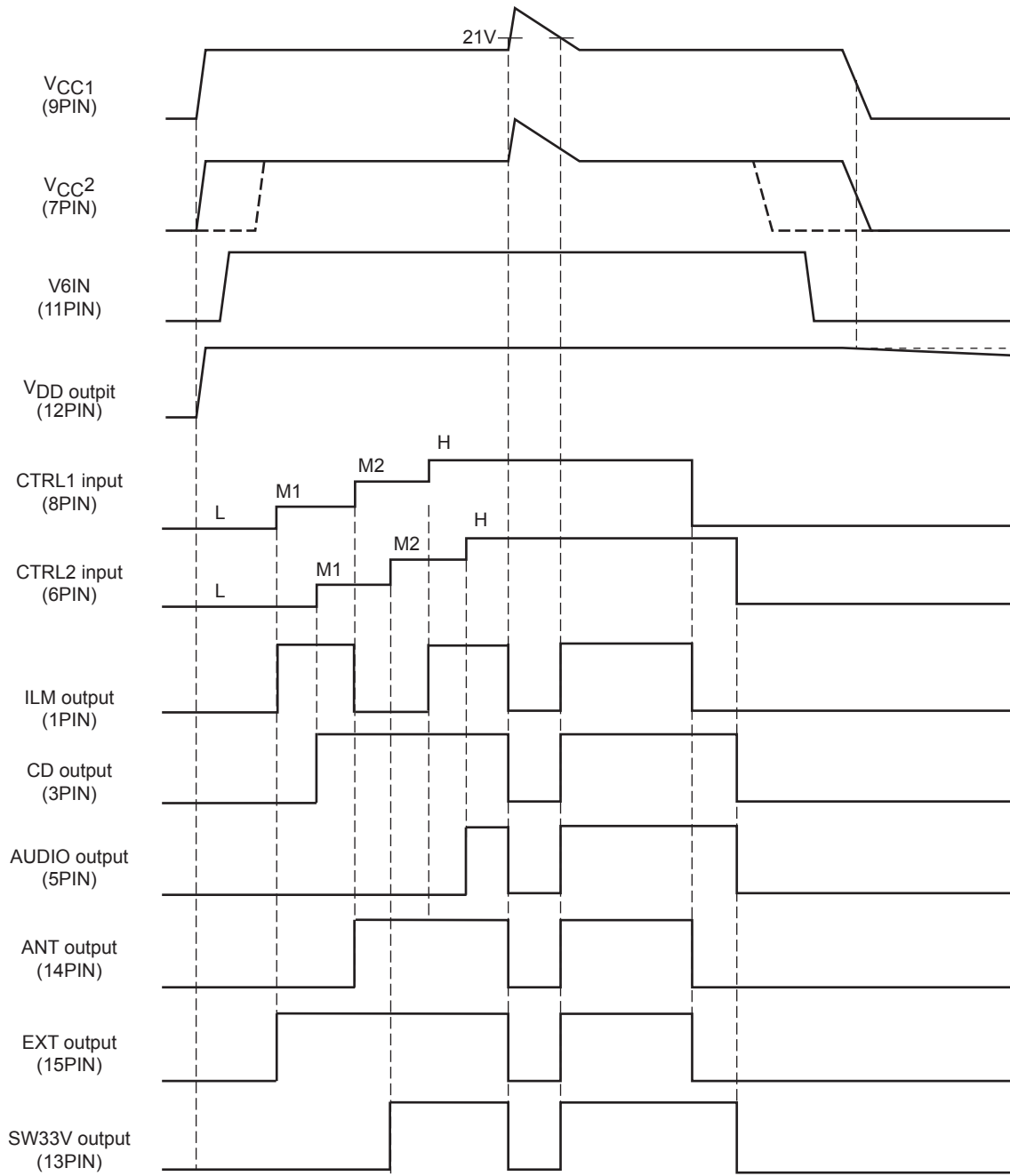
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| Pin No. | Pin name | Description | Equivalent Circuit |
|---------|----------|---|--------------------|
| 15 | EXT | EXT output When CTRL1 = M1, M2, H, EXT is ON $V_{CC}-0.5V/500mA$ | |

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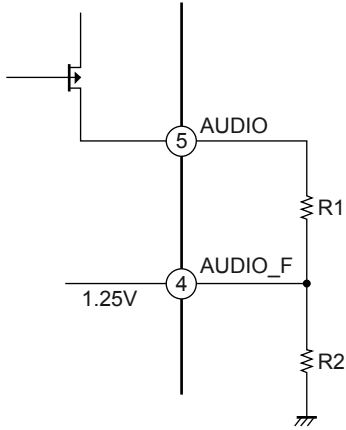
Timing Chart



Caution: The above values are obtained when typ.

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- How to set AUDIO output voltage



[AUDIO_F is determined by internal band-gap reference voltage (typ = 1.25V).]

AUDIO output voltage expression

$$AUDIO = \left(\frac{R_1}{R_2} + 1\right) \times 1.25[V]$$

$$\frac{R_1}{R_2} = \frac{AUDIO}{1.25} - 1$$

Set the ratio of R1 and R2 to satisfy above expression.

(ex) AUDIO = 9V setting

$$\frac{R_1}{R_2} = \frac{9}{1.25} - 1 = 6.2$$

$$\frac{R_1}{R_2} = \frac{24k\Omega}{3.9k\Omega} \cong 6.15$$

$$AUDIO = (6.15 + 1) \times 1.25V \cong \boxed{8.94V}$$

- ILM output voltage is similarly calculated as AUDIO output.

(ex) ILM = 10.5V setting

$$\frac{R_1}{R_2} = \frac{10.5}{1.25} - 1 = 7.4$$

$$\frac{R_1}{R_2} = \frac{56k\Omega}{7.5k\Omega} \cong 7.46$$

$$ILM = (7.46 + 1) \times 1.25V \cong \boxed{10.575V}$$

Note : The above values are typical values. These values have variation among the range of their tolerances.

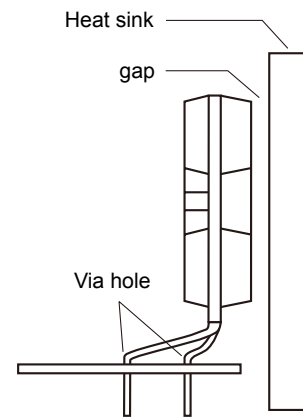
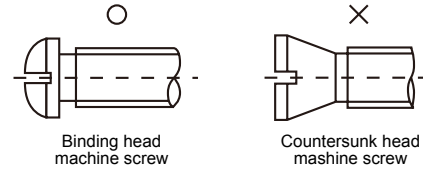
HZIP15 Heat sink attachment

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.
- 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 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.

LV56841PVD

ORDERING INFORMATION

| Device | Package | Shipping (Qty / Packing) |
|---------------|------------------------------------|--------------------------|
| LV56841PVD-XH | HZIP15 (Pb-Free / Halogen Free) | 20 / Fan-Fold |

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