PQ25VB8M2FZ/ PQ25VB012FZ

Variable Output Type, built-in Overheat Shut-Down Function Low Power-Loss Voltage Regulator

■ Features

1. Compact resin full mold package
   (Equivalent to TO-220)
2. Low power-loss
   (Dropout voltage: MAX. 0.5V at I_O=0.5A)
3. Overheat shut-down function (keep shut-down output until power-on again)
4. Variable output voltage (setting range:1.5 to 25V)
5. With built-in overcurrent protection
6. Reference voltage precision:±2.0%
7. With built-in ON/OFF control function

■ Applications

1. Series power supply for TVs and VCRs
2. Power supplies for equipment
3. CRT displays

■ Absolute Maximum Ratings

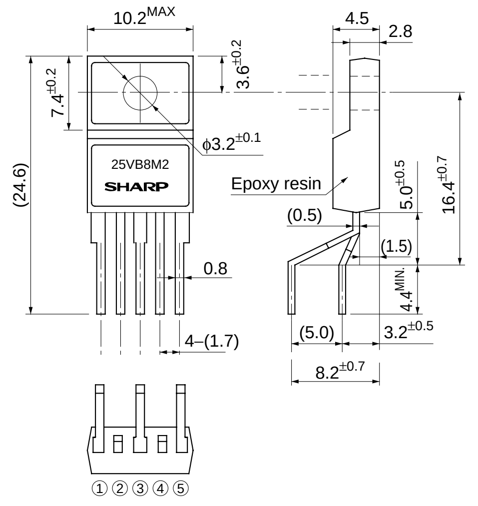
(Ta=25°C)

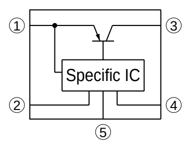
Parameter		Symbol	Rating	Unit
*1 Input voltage		V_{IN}	27	V
*1 ON/OFF control voltage		V_C	27	V
*1 Output adjustment terminal voltage		V_{ADJ}	7	V
Output current	PQ25VB8M2FZ	I_O	0.8	A
	PQ25VB012FZ		1	
*2 Power dissipation		P_{D1}	1.25	W
		P_{D2}	12.5	W
*3 Junction temperature		T_j	150	˚C
Operating temperature		T_{opr}	–20 to +80	˚C
Storage temperature		T_{stg}	–40 to +150	˚C
Soldering temperature		T_{sol}	260 (10s)	˚C

*1 All are open except GND and applicable terminals
*2 P_{D1}:No heat sink, P_{D2}:With infinite heat sink
*3 Overheat shut-down function operates at Tj≥110˚C

■ Outline Dimensions

(Unit : mm)





① DC input (V_{IN})
② ON/OFF control (V_C)
③ DC output (V_O)
④ Output voltage adjustment (V_{ADJ})
⑤ GND

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Internet Internet address for Electronic Components Group http://www.sharp.co.jp/ecg/

■ Electrical Characteristics

(Unless otherwise specified, condition shall be V_{IN}=12V, V_O=10V (R_1=390Ω), I_O=0.5A, V_O=2.7V, Ta=25˚C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Minimum operating supply voltag		$V_{IN(MIN.)}$	–	4.5	–	27	V
Output voltage range		V_O	–	1.5	–	25	V
Load regulation	PQ25VB8M2FZ	$R_{eg}L$	I_O=5mA to 0.8A	–	0.3	1.0	%
	PQ25VB012FZ		I_O=5mA to 1A				
Line regulation		$R_{eg}I$	V_{IN}=11 to 20V, I_O=5mA	–	0.5	1.0	%
Ripple rejection		RR	Refer to Fig.2	45	55	–	dB
Reference voltage		V_{ref}	–	1.225	1.25	1.275	V
Reference voltage temperature coefficient		T_CV_O	T_j=0 to 110˚C, I_O=5mA	–	±1.0	–	%
Dropout voltage		V_{I-O}	*4 I_O=0.5A	–	–	0.5	V
*5 Output on control voltage		$V_{C(ON)}$	*5	2.0	–	–	V
Output on control current		$I_{C(ON)}$	V_C=2.7V	–	–	20	µA
Output off control voltage		$V_{C(OFF)}$	–	–	–	0.8	V
Output off control current		$I_{C(OFF)}$	V_C=0.4V	–	–	–0.4	mA
Quiescent current		I_q	I_O=0A	–	–	7	mA
Overheating shutdown temperature		T_{SD}	–	110	130	150	˚C

*4 Input voltage shall be the value when output voltage is 95% in comparison with the initial value
*5 In case of opening ON/OFF control terminal ②, output voltage turns on

Fig.1 Standard Test Circuit

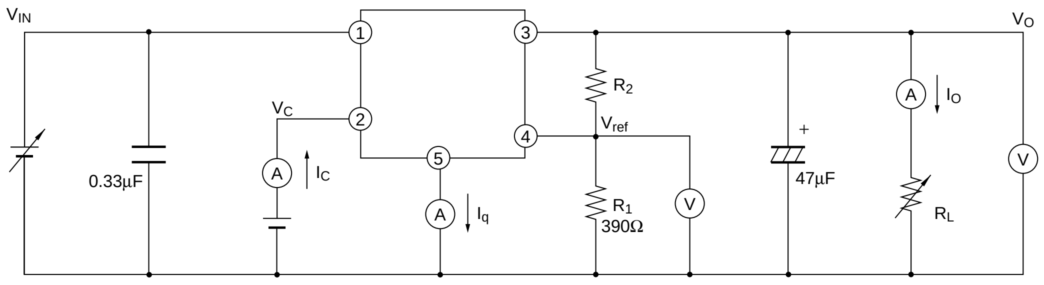
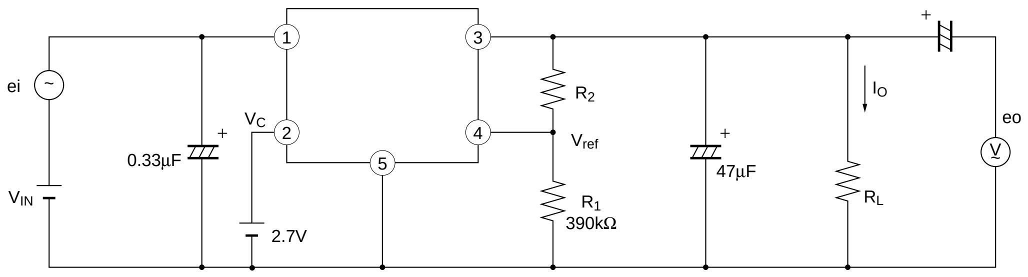
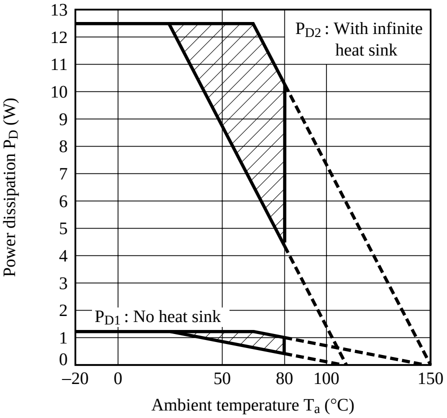


Fig.2 Test Circuit for Ripple Rejection



f=120Hz(sine wave)
ei(rms)=0.5V
V_O=10V(R_1=390Ω)
V_{IN}=12V
I_O=0.5A
RR=20log(ei(rms)/eo(rms))

Fig.3 Power Dissipation vs. Ambient Temperature



Note) Oblique line prtion:Overheat protection may operate in this area

Fig.4 Overcurrent Protection Characteristics (PQ25VB8M2FZ)

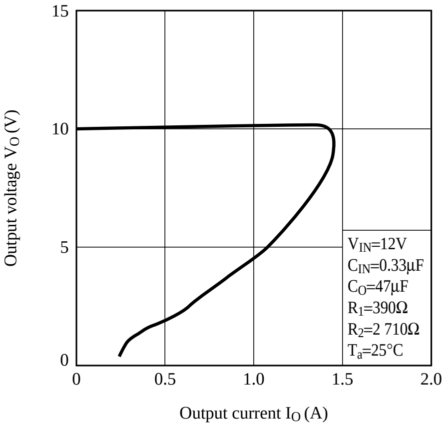


Fig.5 Overcurrent Protection Characteristics (PQ25VB012FZ)

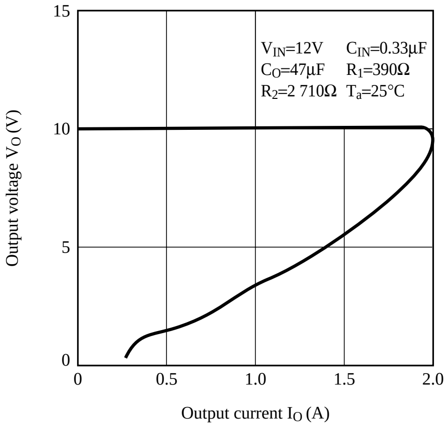


Fig.6 Reference Voltage Fluctuation vs. Junction Temperature (PQ25VB8M2FZ)

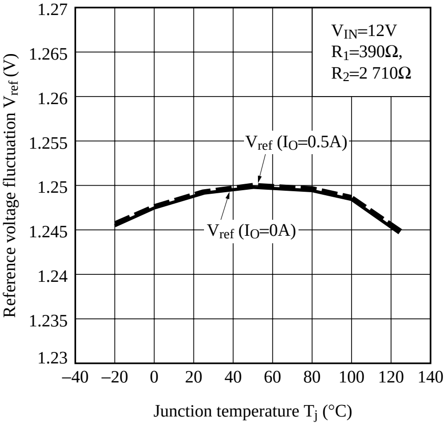


Fig.7 Reference Voltage Fluctuation vs. Junction Temperature (PQ25VB012FZ)

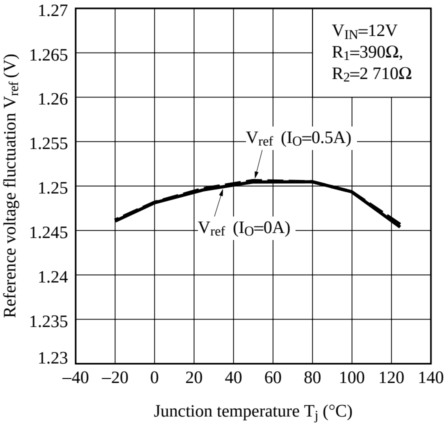


Fig.8 Output Voltage vs. Input Voltage (PQ25VB8M2FZ)

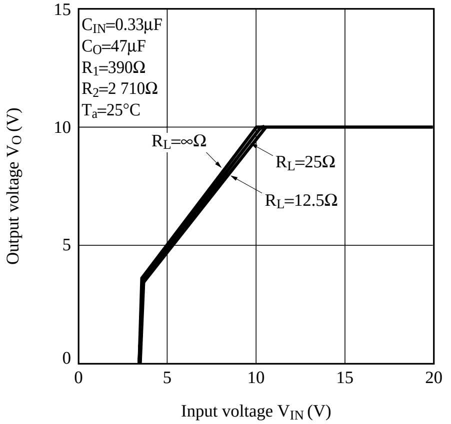


Fig.9 Output Voltage vs. Input Voltage (PQ25VB012FZ)

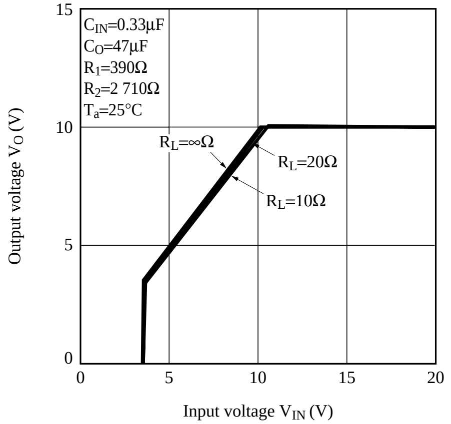


Fig.10 Circuit Operating Current vs. Input Voltage (PQ25VB8M2FZ)

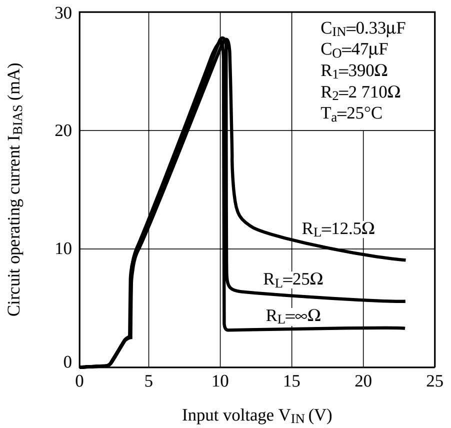


Fig.11 Circuit Operating Current vs. Input Voltage (PQ25VB012FZ)

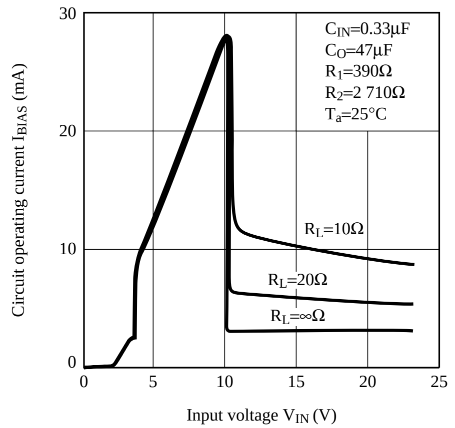


Fig.12 Dropout voltage vs. Junction Temperature (PQ25VB8M2FZ)

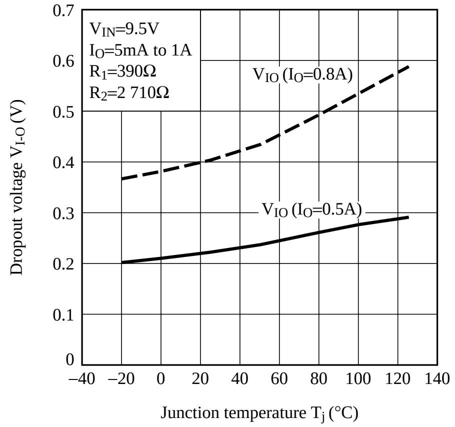


Fig.13 Dropout voltage vs. Junction Temperature (PQ25VB012FZ)

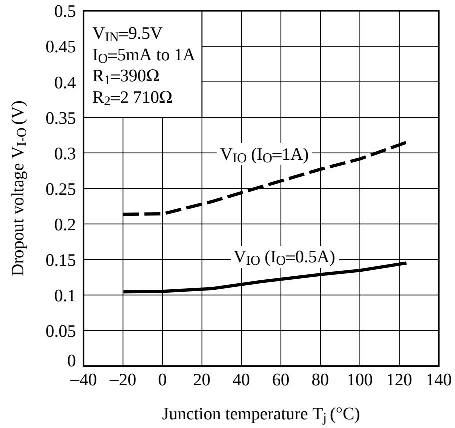


Fig.14 Quiescent Current vs. Junction Temperature (PQ25VB8M2FZ)

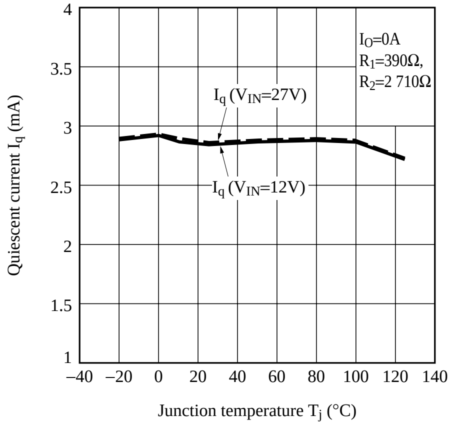


Fig.15 Quiescent Current vs. Junction Temperature (PQ25VB012FZ)

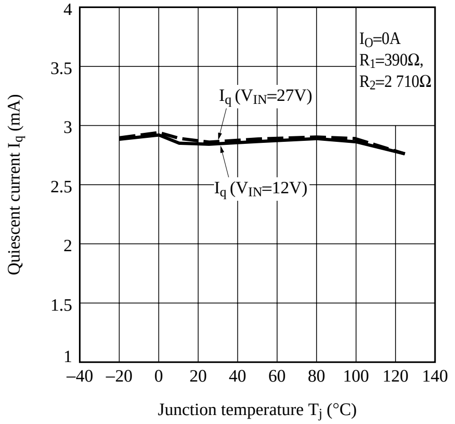


Fig.16 Ripple Rejection vs. Input Ripple Frequency (PQ25VB8M2FZ)

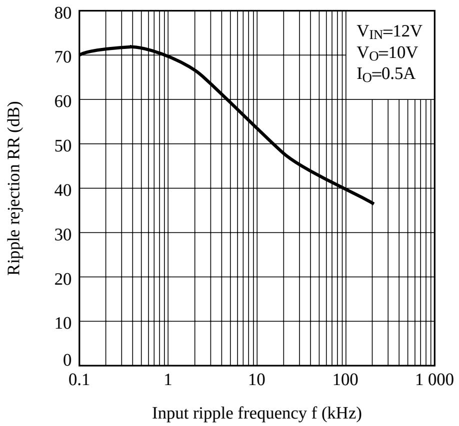


Fig.17 Ripple Rejection vs. Input Ripple Frequency (PQ25VB012FZ)

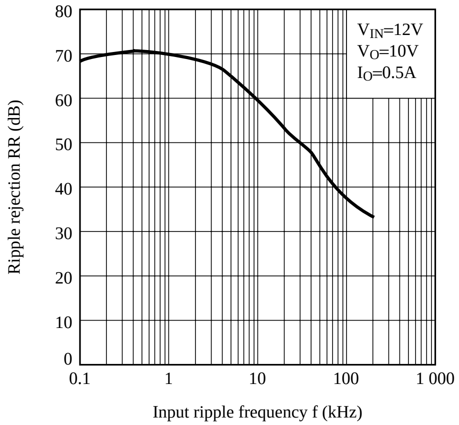
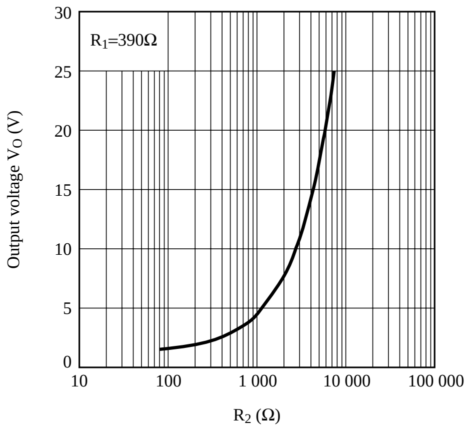
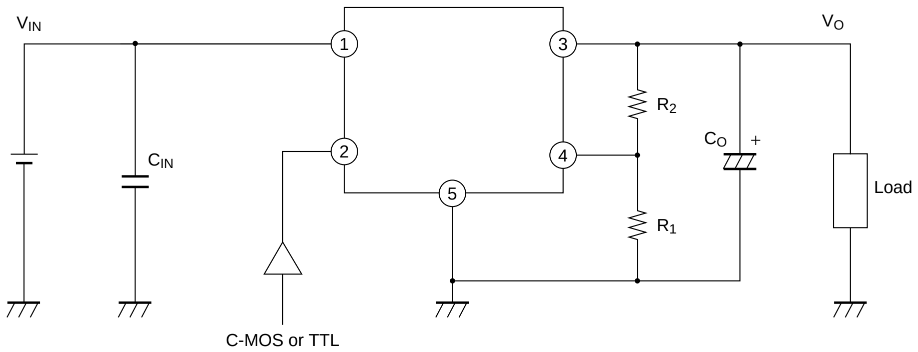


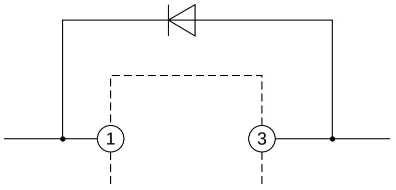
Fig.18 Output Voltage Adjustment Characteristics



■ Precautions for Use

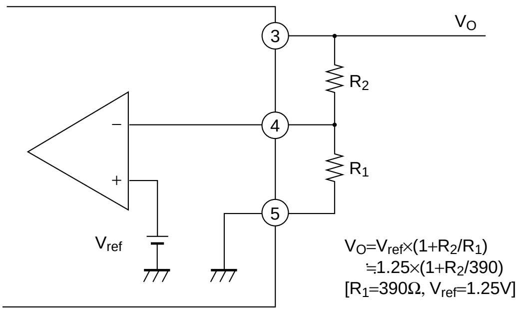


1. External connection
   (1) The connecting wiring of C_O and each terminal must be as short as possible. Owing to type, value and wiring condition of capacitor, it may oscillate. Confirm the output waveform under the actual condition before using.
   (2) ON/OFF control terminal ② is compatible with LS-TTL. It enables to be directly drive by TTL or C-MOS standard logic (RCA4000 series).
   (3) If voltage is applied under the conditions that the device pin is connected divergently or reversely, the deterioration of characteristics or damage may occur. Never allow improper mounting.
   (4) If voltage exceeding the voltage of DC input terminal ① is applied to the output terminal ③, the element may be damaged. Especially when the DC input terminal ① is short-circuited to the GND in ordinary operating state, charges accumulated in the output capacitor C_O flow to the input side, causing damage to the element. In this case, connect the ordinary silicon diode as shown in the figure.
2. Thermal protection design
   Power dissipation of devices is obtained by the following equation.
   $P_D = I_O \times (V_{IN} - V_O) + V_{IN} \times I_q$
   When ambient temperature T_a and power dissipation P_D during operation are determined, operate element within the safety operation area specified by the derating curve. Insufficient radiation gives an unfavorable influence to the normal operation and reliability of the device.
   In the external area of the safety operation area shown by the derating curve, the overheat protection circuit may operate to shut-down output. However please avoid keeping such condition for a long time.
3. ESD (Electrostatic Sensitivity Discharge)
   Be careful not to apply electrostatic discharge to the device since this device employs a bipolar IC and may be damaged by electro static discharge. Followings are some methods against excessive voltage caused by electro static discharge.
   (1) Human body must be grounded to discharge the electro charge which is charged in the body or cloth.
   (2) Anything that is in contact with the device such as workbench, inserter, or measuring instrument must be grounded.
   (3) Use a soldering dip basin with a minimum leak current (isolation resistance 10MΩ or more) from the AC power supply line. Also the soldering dip basin must be grounded.

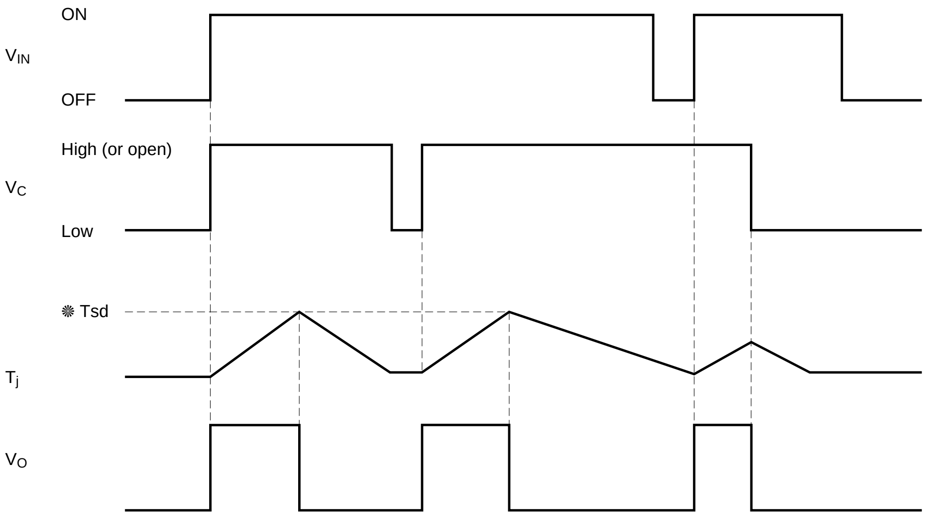


■ Output Voltage Fine Tuning

1. Connecting external resistors R_1 and R_2 to terminals ③, ④, ⑤ allows the output voltage to be fine tuned from 1.5V to 25V. Refer to the figure below and Fig.18 when connecting external resistors for fine tuning output voltage.



■ Overheat Shut-down Characteristics



❋ Tsd:Overheat shut-down temperature (Tj≥110˚C)

(1) Overheat shut-down operates at T_j=Tsd and output OFF-state is maintained.

(2) OFF-state is kept untill V_{IN} is once turned off or V_C is turned down to the "L" level.

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  — Telecommunication equipment [terminal]
  — Test and measurement equipment
  — Industrial control
  — Audio visual equipment
  — Consumer electronics

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