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Sharp Microelectronics
PC81510NSZ0X

For any questions, you can email us directly:
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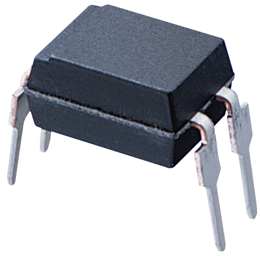
Distributor of Sharp Microelectronics: Excellent Integrated System Limited
Datasheet of PC81510NSZ0X - OPTOISOLATOR 5KV DARL 4DIP
Contact us: sales@integrated-circuit.com Website: www.integrated-circuit.com

PC81510NSZ0F

DIP 4pin Darlington Phototransistor Output, Low Input Current Photocoupler



■ Description

PC81510NSZ0F contains an IRED optically coupled to a phototransistor.

It is packaged in a 4pin DIP.

Input-output isolation voltage(rms) is 5.0kV.

CTR is MIN. 600% at input current of 0.5mA.

■ Features

1. 4pin DIP package
2. Double transfer mold package (Ideal for Flow Soldering)
3. Low input drive current (I_F=0.5mA)
4. Darlington phototransistor output (CTR : MIN. 600% at I_F=0.5mA, V_{CE}=2V)
5. High isolation voltage between input and output ($V_{iso(rms)}$: 5.0kV)
6. RoHS directive compliant

■ Agency approvals/Compliance

1. Recognized by UL1577 (Double protection isolation), file No. E64380 (as model No. **PC8151**)
2. Package resin : UL flammability grade (94V-0)

■ Applications

1. Home appliances
2. Programmable controllers

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Sheet No.: D2-A03902FEN
Date Jun. 30. 2005
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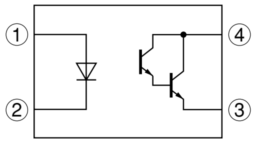
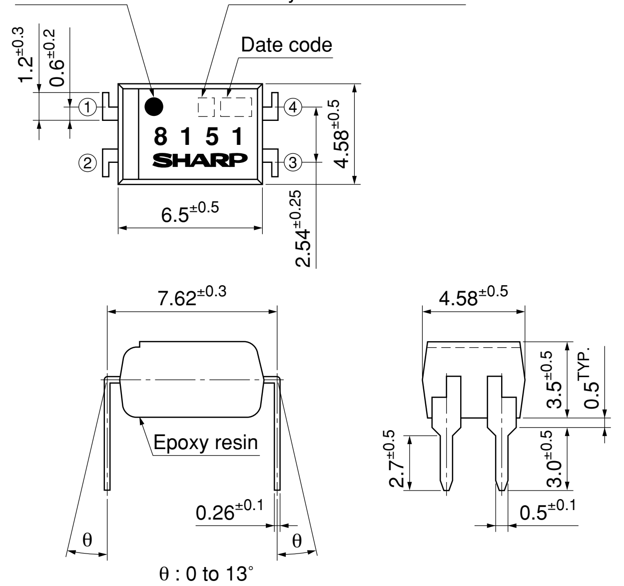
■ Internal Connection Diagram



① Anode
② Cathode
③ Emitter
④ Collector

■ Outline Dimensions

(Unit : mm)



Product mass : approx. 0.23g

Plating material : SnCu (Cu : TYP. 2%)

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Datasheet of PC81510NSZ0X - OPTOISOLATOR 5KV DARL 4DIP
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Date code (2 digit)

1st digit				2nd digit	
Year of production				Month of production	
A.D.	Mark	A.D	Mark	Month	Mark
1990	A	2002	P	January	1
1991	B	2003	R	February	2
1992	C	2004	S	March	3
1993	D	2005	T	April	4
1994	E	2006	U	May	5
1995	F	2007	V	June	6
1996	H	2008	W	July	7
1997	J	2009	X	August	8
1998	K	2010	A	September	9
1999	L	2011	B	October	O
2000	M	2012	C	November	N
2001	N	⋮	⋮	December	D

repeats in a 20 year cycle

Factory identification mark

Factory identification Mark	Country of origin
no mark	Japan
■	
◢	Indonesia
◥	China

* This factory marking is for identification purpose only.
Please contact the local SHARP sales representative to see the actual status of the production.

Rank mark

There is no rank mark indicator.

■ Absolute Maximum Ratings

(T_a=25˚C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I_F	10	mA
Input	*1 Peak forward current	I_{FM}	200	mA
Input	Reverse voltage	V_R	6	V
Input	Power dissipation	P	15	mW
Output	Collector-emitter voltage	V_{CEO}	35	V
Output	Emitter-collector voltage	V_{ECO}	6	V
Output	Collector current	I_C	80	mA
Output	Collector power dissipation	P_C	150	mW
Total power dissipation		P_{tot}	170	mW
*2 Isolation voltage		$V_{iso\ (rms)}$	5.0	kV
Operating temperature		T_{opr}	−30 to +100	˚C
Storage temperature		T_{stg}	−55 to +125	˚C
*3 Soldering temperature		T_{sol}	260	˚C

*1 Pulse width≤100μs, Duty ratio : 0.001
*2 40 to 60%RH, AC for 1 minute, f=60Hz
*3 For 10s

■ Electro-optical Characteristics

(T_a=25˚C)

Parameter			Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage		V_F	I_F=5mA	–	1.2	1.4	V
Input	Reverse current		I_R	V_R=4V	–	–	10	μA
Input	Terminal capacitance		C_t	V=0, f=1kHz	–	30	250	pF
Output	Collector dark current		I_{CEO}	V_{CE}=10V, I_F=0	–	–	1 000	nA
Output	Collector-emitter breakdown voltage		BV_{CEO}	I_C=0.1mA, I_F=0	35	–	–	V
Output	Emitter-collector breakdown voltage		BV_{ECO}	I_E=10μA, I_F=0	6	–	–	V
Transfer charac-teristics	Collector current		I_C	I_F=0.5mA, V_{CE}=2V	3	14	60	mA
Transfer charac-teristics	Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_F=1mA, I_C=2mA	–	–	1.0	V
Transfer charac-teristics	Isolation resistance		R_{ISO}	DC500V, 40 to 60%RH	5×10^{10}	1×10^{11}	–	Ω
Transfer charac-teristics	Floating capacitance		C_f	V=0, f=1MHz	–	0.6	1.0	pF
Transfer charac-teristics	Response time	Rise time	t_r	V_{CE}=2V, I_C=10mA, R_L=100Ω	–	60	300	μs
Transfer charac-teristics	Response time	Fall time	t_f	V_{CE}=2V, I_C=10mA, R_L=100Ω	–	53	250	μs

Fig.1 Forward Current vs. Ambient Temperature

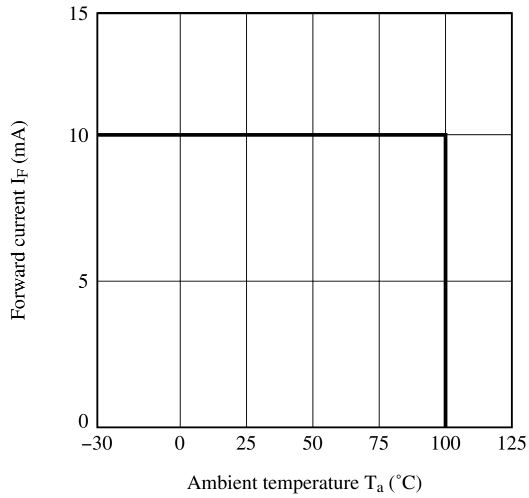


Fig.2 Diode Power Dissipation vs. Ambient Temperature

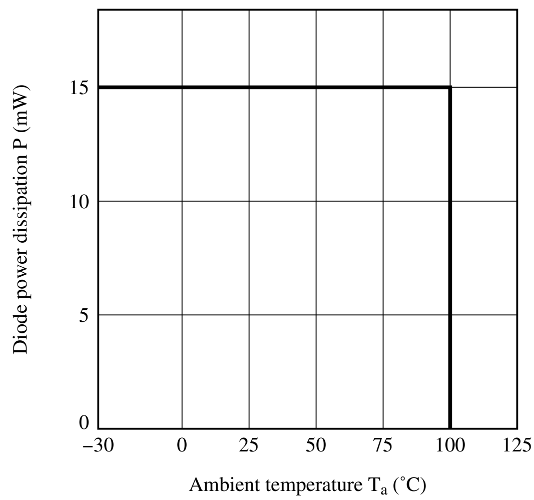


Fig.3 Collector Power Dissipation vs. Ambient Temperature

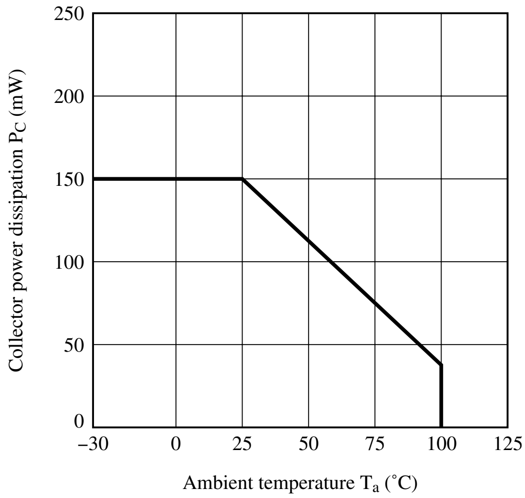


Fig.4 Total Power Dissipation vs. Ambient Temperature

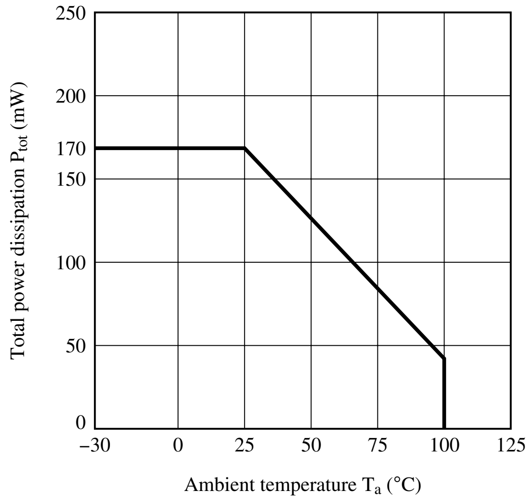


Fig.5 Peak Forward Current vs. Duty Ratio

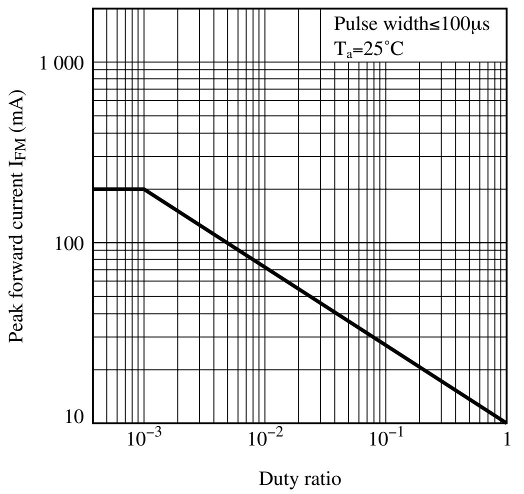


Fig.6 Forward Current vs. Forward Voltage

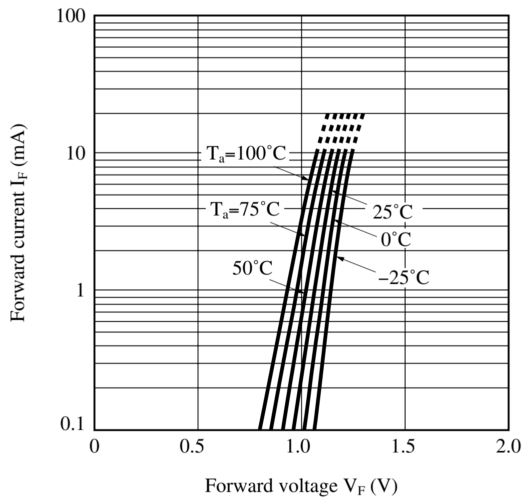


Fig.7 Current Transfer Ratio vs. Forward Current

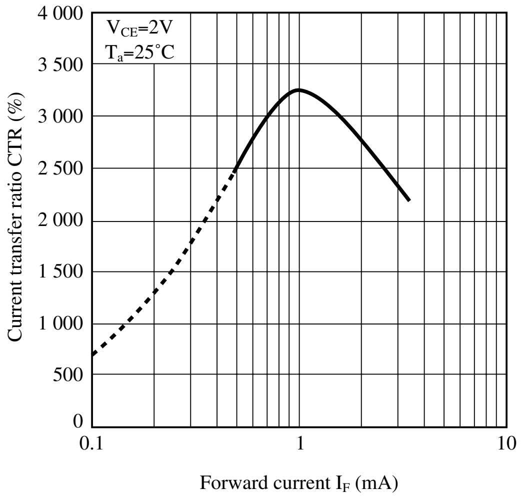


Fig.8 Collector Current vs. Forward Current

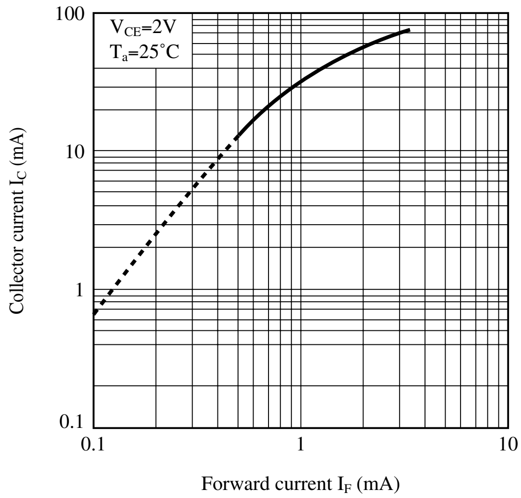


Fig.9 Collector Current vs. Collector-emitter Voltage(1)

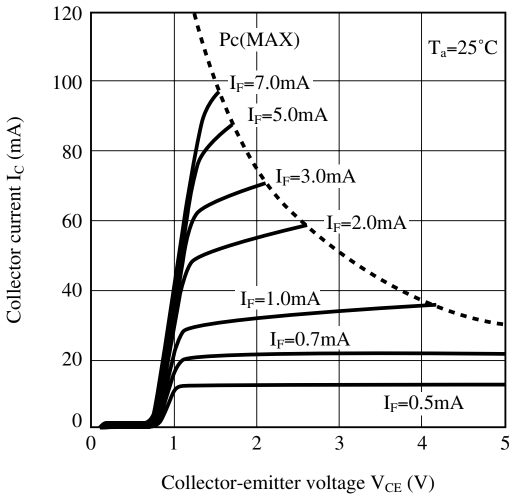


Fig.10 Collector Current vs. Collector-emitter Voltage(2)

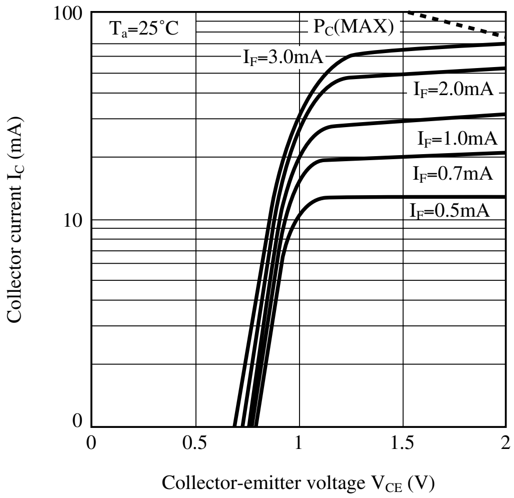


Fig.11 Relative Current Transfer Ratio vs. Ambient Temperature

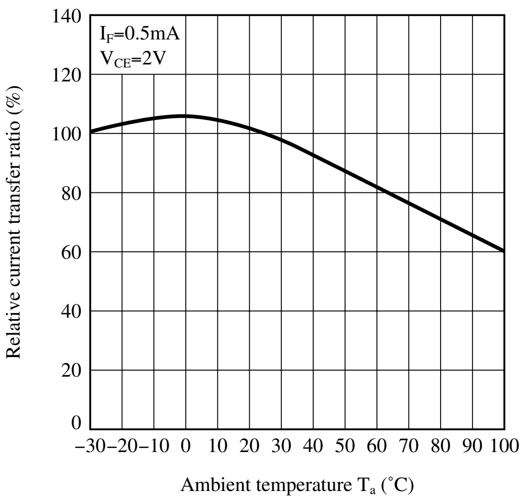


Fig.12 Collector - emitter Saturation Voltage vs. Ambient Temperature

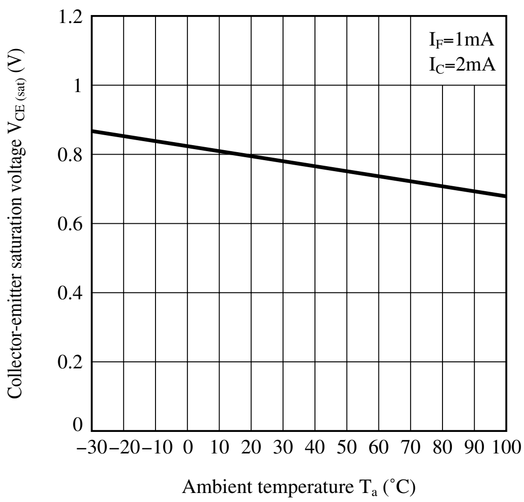


Fig.13 Collector Dark Current vs. Ambient Temperature

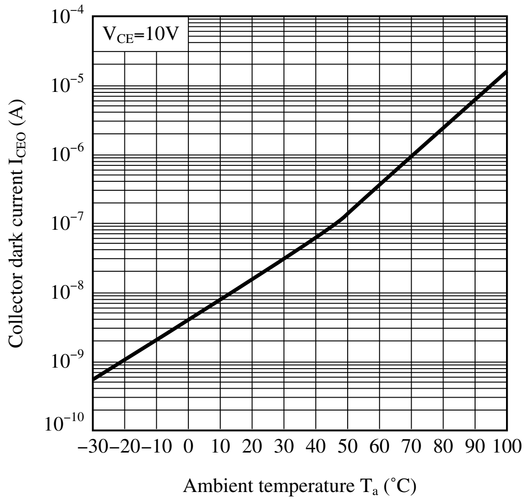


Fig.14 Response Time vs. Load Resistance

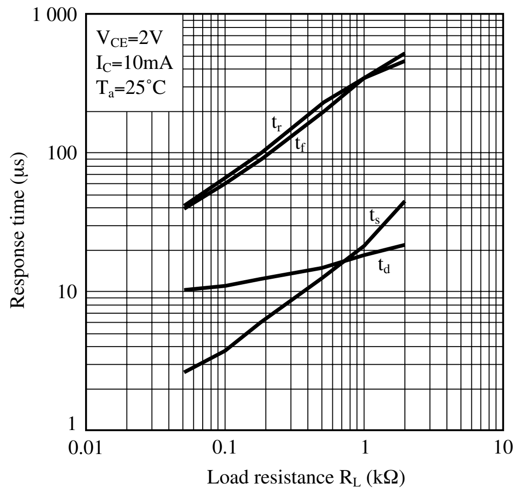
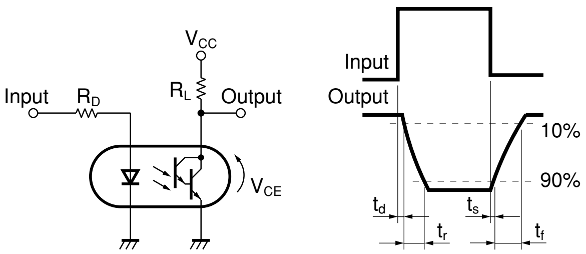


Fig.15 Test Circuit for Response Time



Please refer to the conditions in Fig.14.

Remarks : Please be aware that all data in the graph are just for reference and not for guarantee.

■ Design Considerations

● Design guide

While operating at I_F<0.5mA, CTR variation may increase.
Please make design considering this fact.

This product is not designed against irradiation and incorporates non-coherent IRED.

● Degradation

In general, the emission of the IRED used in photocouplers will degrade over time.
In the case of long term operation, please take the general IRED degradation (50% degradation over 5 years) into the design consideration.

■ Manufacturing Guidelines

● Soldering Method

Flow Soldering :

Due to SHARP's double transfer mold construction submersion in flow solder bath is allowed under the below listed guidelines.

Flow soldering should be completed below 270˚C and within 10s.
Preheating is within the bounds of 100 to 150˚C and 30 to 80s.
Please don't solder more than twice.

Hand soldering

Hand soldering should be completed within 3s when the point of solder iron is below 400˚C.
Please don't solder more than twice.

Other notices

Please test the soldering method in actual condition and make sure the soldering works fine, since the impact on the junction between the device and PCB varies depending on the tooling and soldering conditions.

● Cleaning instructions

Solvent cleaning:

Solvent temperature should be 45˚C or below Immersion time should be 3 minutes or less

Ultrasonic cleaning:

The impact on the device varies depending on the size of the cleaning bath, ultrasonic output, cleaning time, size of PCB and mounting method of the device.
Therefore, please make sure the device withstands the ultrasonic cleaning in actual conditions in advance of mass production.

Recommended solvent materials:

Ethyl alcohol, Methyl alcohol and Isopropyl alcohol
In case the other type of solvent materials are intended to be used, please make sure they work fine in actual using conditions since some materials may erode the packaging resin.

● Presence of ODC

This product shall not contain the following materials.
And they are not used in the production process for this product.
Regulation substances : CFCs, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methylchloroform)

Specific brominated flame retardants such as the PBBOs and PBBs are not used in this product at all.

This product shall not contain the following materials banned in the RoHS Directive (2002/95/EC).

- •Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE).

■ Package specification

● Sleeve package

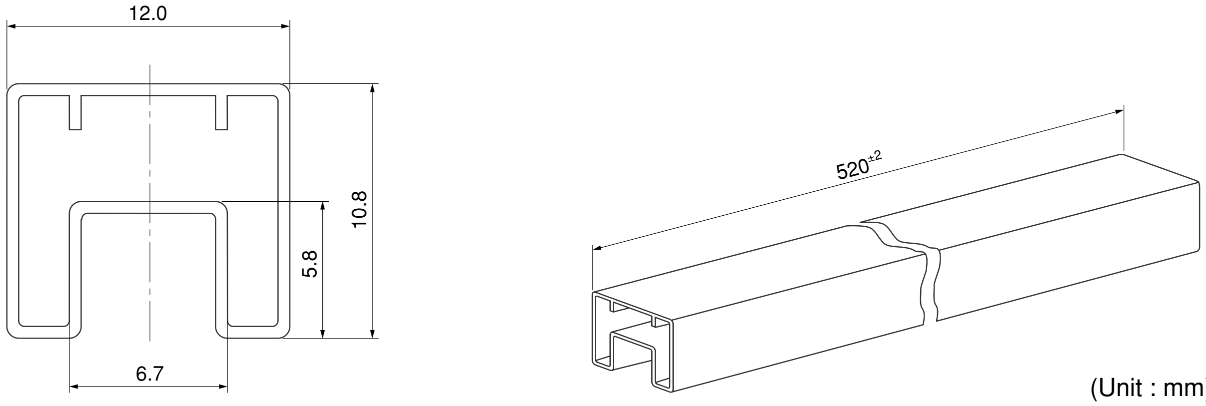
Package materials

Sleeve : HIPS (with anti-static material)
Stopper : Styrene-Elastomer

Package method

MAX. 100pcs of products shall be packaged in a sleeve. Both ends shall be closed by tabbed and tabless stoppers.
The product shall be arranged in the sleeve with its anode mark on the tabless stopper side.
MAX. 20 sleeves in one case.

Sleeve outline dimensions



(Unit : mm)

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- --- Personal computers
- --- Office automation equipment
- --- Telecommunication equipment [terminal]
- --- Test and measurement equipment
- --- Industrial control
- --- Audio visual equipment
- --- Consumer electronics

(ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
- --- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
- --- Traffic signals
- --- Gas leakage sensor breakers
- --- Alarm equipment
- --- Various safety devices, etc.

(iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
- --- Space applications
- --- Telecommunication equipment [trunk lines]
- --- Nuclear power control equipment
- --- Medical and other life support equipment (e.g., scuba).

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