

MOS FIELD EFFECT TRANSISTOR 2SK3113

SWITCHING N-CHANNEL POWER MOS FET INDUSTRIAL USE

DESCRIPTION

The 2SK3113 is N-channel DMOS FET device that features a low gate charge and excellent switching characteristics, and designed for high voltage applications such as switching power supply, AC adapter.

ORDERING INFORMATION

Part Number	Package
2SK3113	TO-251
2SK3113-Z	TO-252

FEATURES

- Low gate charge
 $Q_G = 9 \text{ nC TYP. (} V_{DD} = 450 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 2.0 \text{ A)}$
- Gate voltage rating $\pm 30 \text{ V}$
- Low On-state resistance
 $R_{DS(on)} = 4.4 \Omega \text{ (MAX.) (} V_{GS} = 10 \text{ V, } I_D = 2.0 \text{ A)}$
- Avalanche capability ratings

ABSOLUTE MAXIMUM RATING ($T_A = 25^\circ\text{C}$)

Drain to source voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	600	V
Gate to source voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 30	V
Drain current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 2.0	A
Drain current (pulse) ^{Note1}	$I_{D(pulse)}$	± 8.0	A
Total power dissipation ($T_A = 25^\circ\text{C}$) ^{Note2}	P_{T1}	1.0	W
Total power dissipation ($T_C = 25^\circ\text{C}$)	P_{T2}	20	W
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$
Single avalanche current ^{Note3}	I_{AS}	2.0	A
Single avalanche energy ^{Note3}	E_{AS}	2.7	mJ
Diode recovery dv/dt ^{Note4}	dv/dt	3.5	V/ns

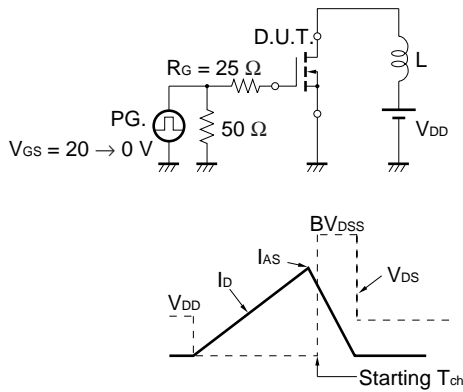
- Notes**
1. $PW \leq 10 \mu\text{s}$, Duty cycle $\leq 1 \%$
 2. On glass epoxy board with $40 \times 40 \times 1.6 \text{ mm}$
 3. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 150 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \text{ V} \rightarrow 0 \text{ V}$
 4. $I_F \leq 1.0 \text{ A}$, $V_{clamp} = 600 \text{ V}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $T_A = 25^\circ\text{C}$

The information in this document is subject to change without notice.

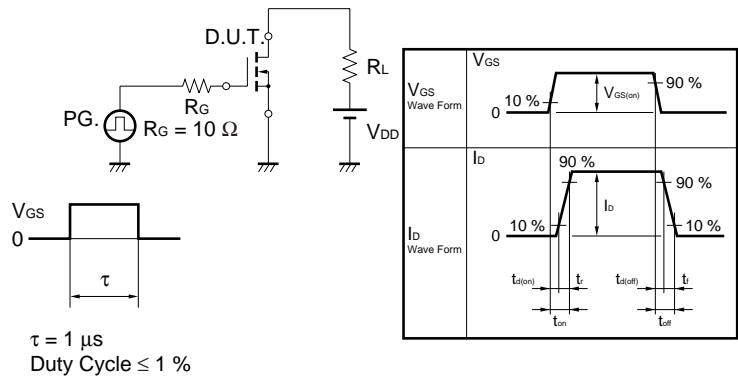
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Leakage Current	I _{DSS}			100	μA	V _{DS} = 600 V, V _{GS} = 0 V
Gate Leakage Current	I _{GSS}			±10	μA	V _{GS} = ±30 V, V _{DS} = 0 V
Gate Cut-off Voltage	V _{GS(off)}	2.5		3.5	V	V _{DS} = 10 V, I _D = 1 mA
Forward Transfer Admittance	y _{fs}	0.5			S	V _{DS} = 10 V, I _D = 1.0 A
Drain to Source On-state Resistance	R _{DS(on)}		3.3	4.4	Ω	V _{GS} = 10 V, I _D = 1.0 A
Input Capacitance	C _{iss}		290		pF	V _{DS} = 10 V
Output Capacitance	C _{oss}		60		pF	V _{GS} = 0 V
Reverse Transfer Capacitance	C _{rss}		5		pF	f = 1 MHz
Turn-on Delay Time	t _{d(on)}		7		ns	V _{DD} = 150 V, I _D = 1.0 A
Rise Time	t _r		2		ns	V _{GS(on)} = 10 V
Turn-off Delay Time	t _{d(off)}		22		ns	R _G = 10 Ω
Fall Time	t _f		9		ns	R _L = 10 Ω
Total Gate Charge	Q _G		9		nC	V _{DD} = 450 V
Gate to Source Charge	Q _{GS}		2.4		nC	V _{GS} = 10 V
Gate to Drain Charge	Q _{GD}		2		nC	I _D = 2.0 A
Diode Forward Voltage	V _{F(S-D)}		0.9		V	I _F = 2.0 A, V _{GS} = 0 V
Reverse Recovery Time	T _{rr}		0.9		μs	I _F = 2.0 A, V _{GS} = 0 V
Reverse Recovery Charge	Q _{rr}		2.0		μC	di/dt = 50 A/μs

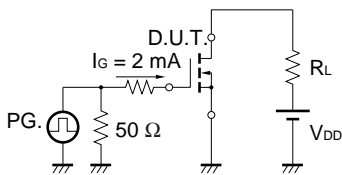
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

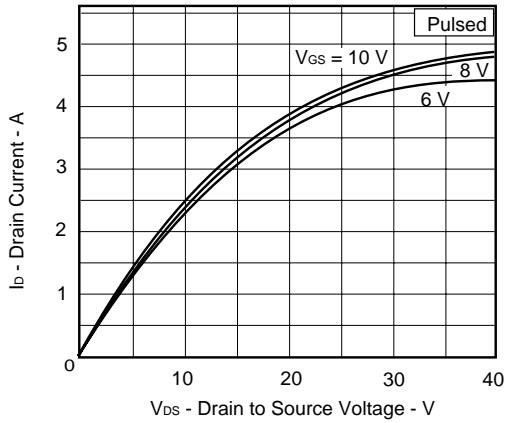


TEST CIRCUIT 3 GATE CHARGE

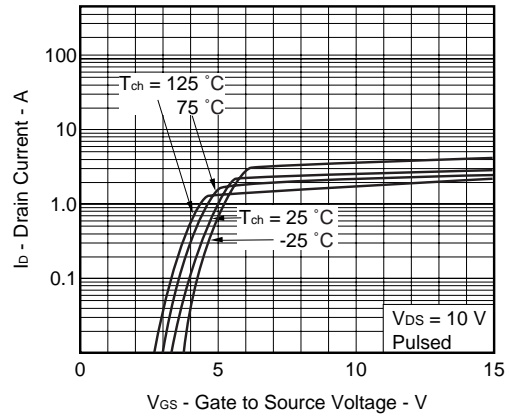


TYPICAL CHARACTERISTICS (T_A = 25°C)

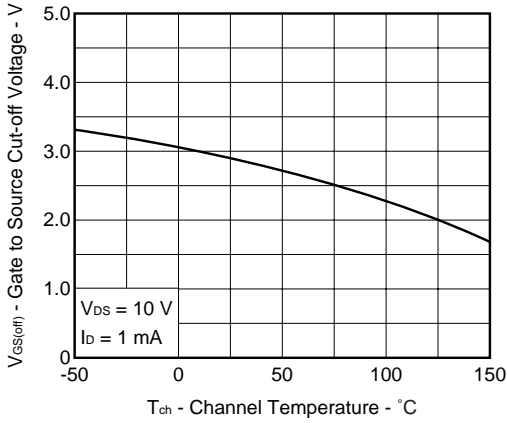
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



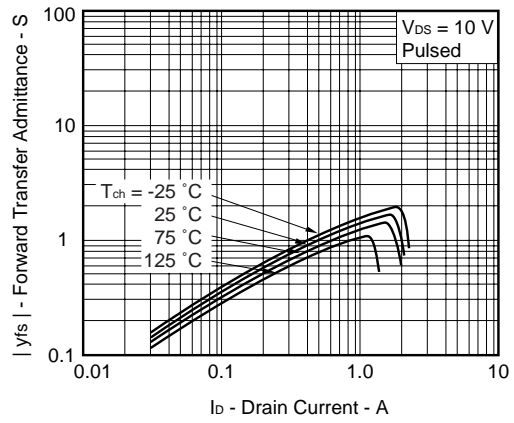
FORWARD TRANSFER CHARACTERISTICS



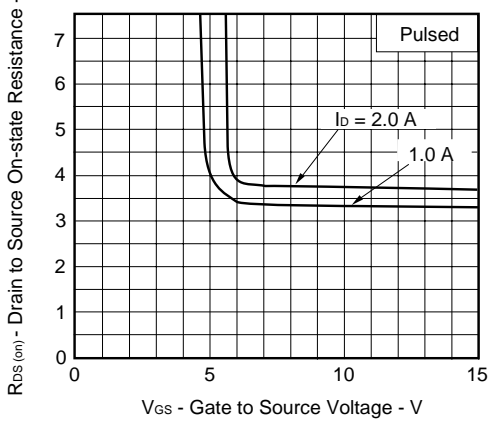
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



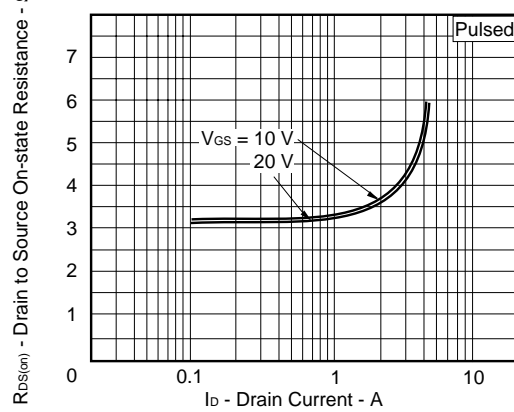
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT

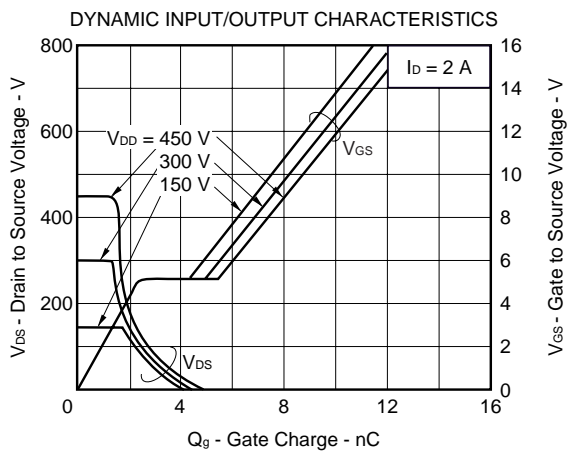
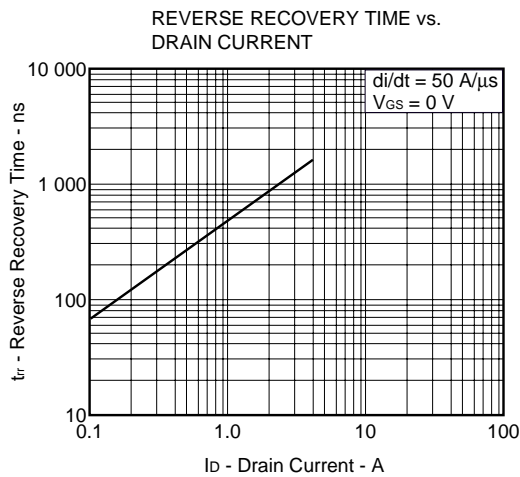
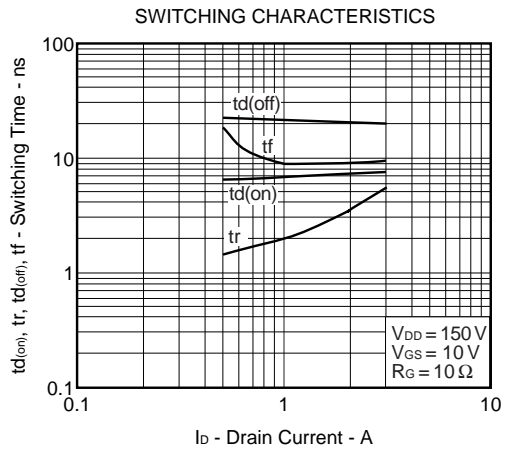
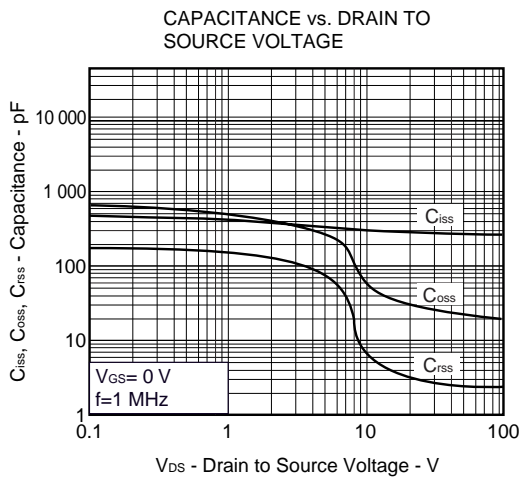
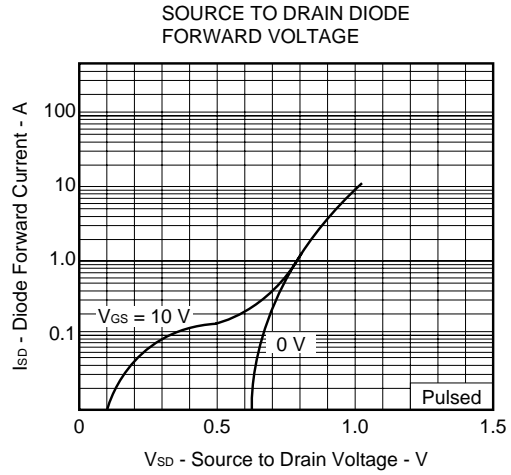
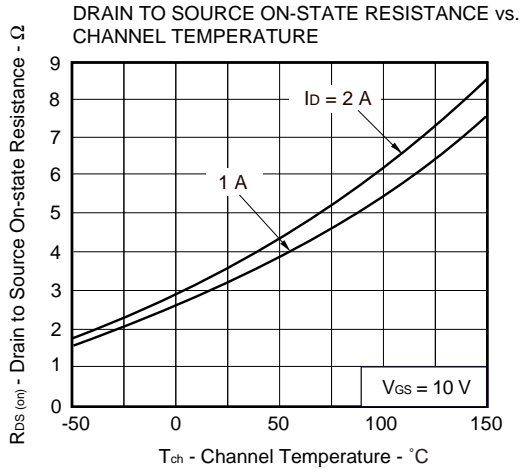


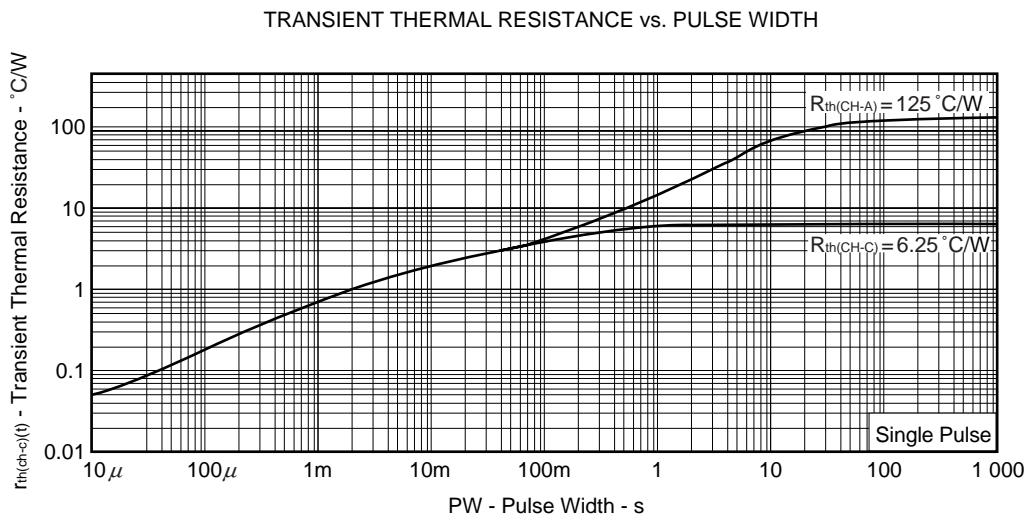
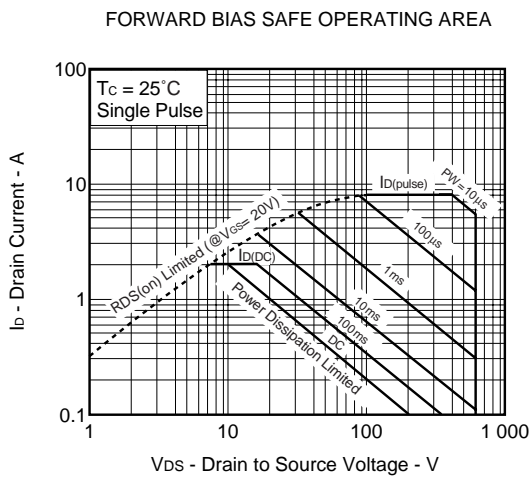
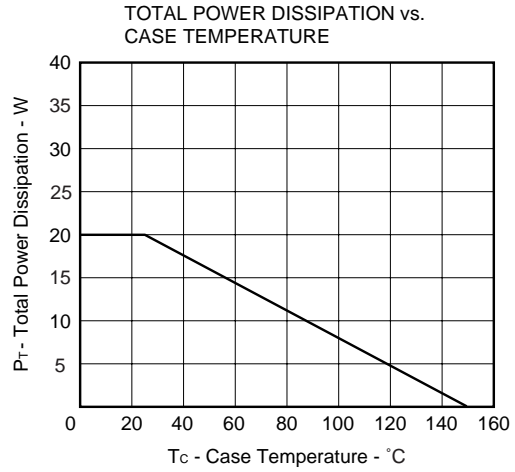
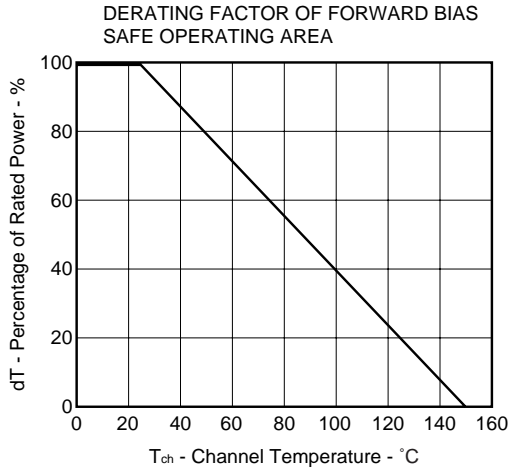
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

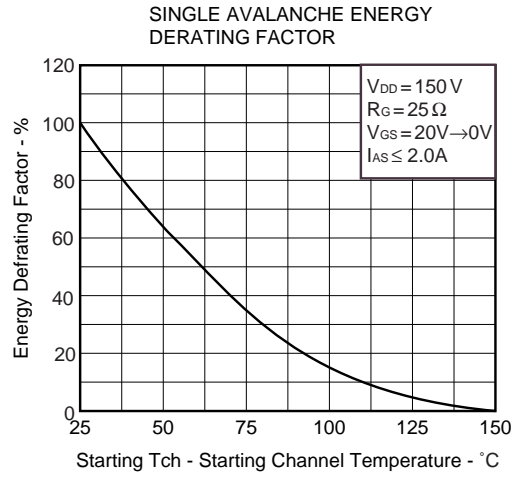
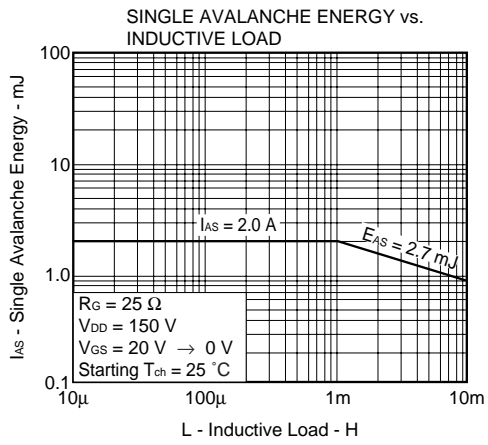


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



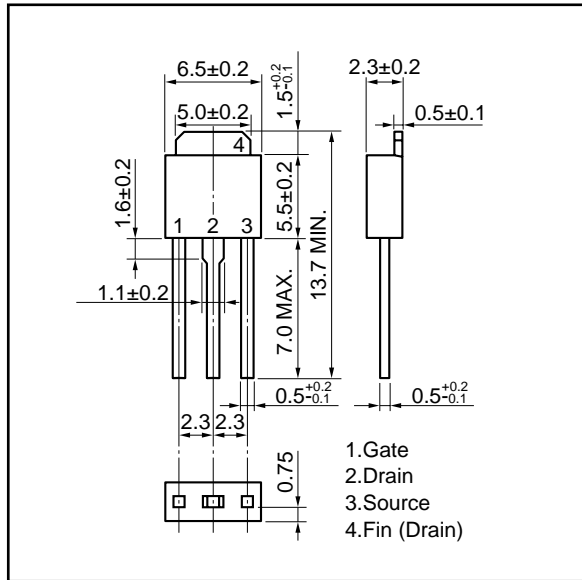




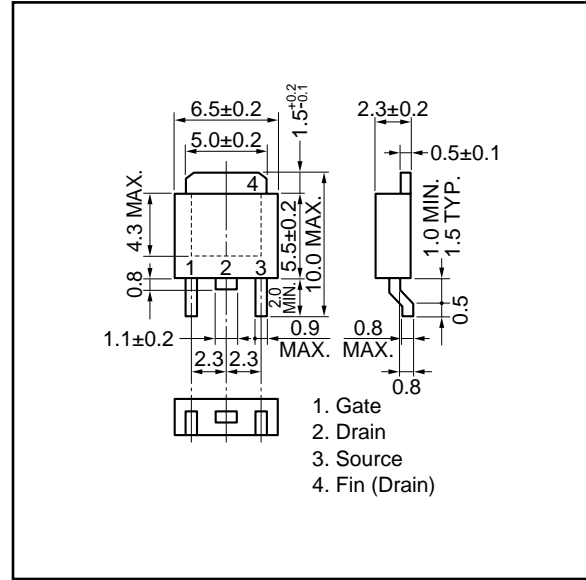


PACKAGE DRAWINGS (Unit : mm)

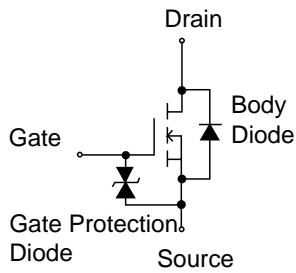
1)TO-251 (MP-3)



2)TO-252 (MP-3Z)



EQUIVALENT CIRCUIT



Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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Anti-radioactive design is not implemented in this product.