

μPA1931

MOS FIELD EFFECT TRANSISTOR

 R07DS0009EJ0103
 Rev.1.03
 May 09, 2012

Description

The μPA1931 is a switching device, which can be driven directly by a 4.5 V power source.

The μPA1931 features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as power switch of portable machine and so on.

Features

- 4.5 V drive available
- Low on-state resistance
 - $R_{DS(on)1} = 65 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = -10 \text{ V}$, $I_D = -1.8 \text{ A}$)
 - $R_{DS(on)2} = 100 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = -4.5 \text{ V}$, $I_D = -1.8 \text{ A}$)

Ordering Information

Part No.	Lead Plating	Packing	Package
μPA1931TE-T1-AT *1	Pure Sn (Tin)	Tape 3000 p/reel	SC-95 (Mini Mold Thin Type) typ. 0.011 g
μPA1931TE-T2-AT *1			

Note: *1 This product does not contain Pb.

"-T1" and "-T2" in Part No. indicate the unit orientation.

Marking: UB

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Item	Symbol	Ratings	Unit
Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	-40	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	∓ 20	V
Drain Current (DC) ($T_A = 25^\circ\text{C}$)	$I_{D(DC)}$	∓ 4.5	A
Drain Current (pulse) *1	$I_{D(pulse)}$	∓ 18	A
Total Power Dissipation	P_{T1}	0.2	W
Total Power Dissipation *2	P_{T2}	2.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$
Single Avalanche Current *3	I_{AS}	3.5	A
Single Avalanche Energy *3	E_{AS}	1.2	mJ

Notes: *1 $P_W \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

*2 Mounted on FR-4 board of 50 mm × 50 mm × 1.6 mm, $t \leq 5 \text{ sec}$

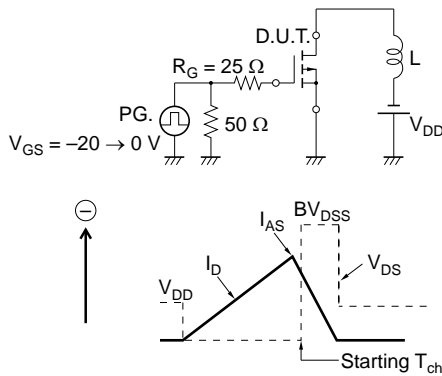
*3 $T_{ch(peak)} \leq 150^\circ\text{C}$, $R_G = 25 \Omega$

Electrical Characteristics ($T_A = 25^\circ\text{C}$)

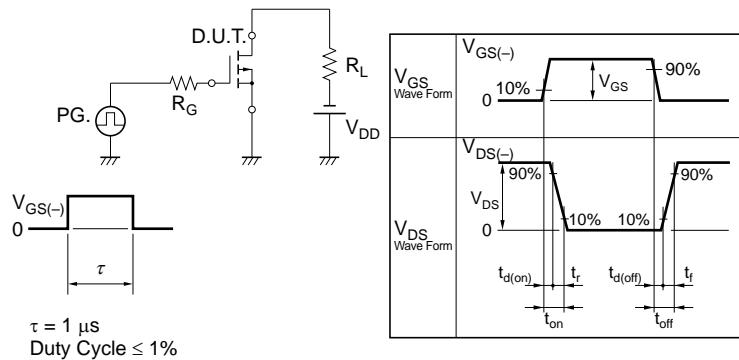
Item	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I_{DSS}			-10	μA	$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}$
Gate Leakage Current	I_{GSS}			±20	μA	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$
Gate Cut-off Voltage	$V_{GS(off)}$	-1.0	-1.7	-2.5	V	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$
Forward Transfer Admittance *1	$ y_{fs} $	2.5			S	$V_{DS} = -10\text{ V}, I_D = -1.8\text{ A}$
Drain to Source On-state Resistance *1	$R_{DS(on)1}$		44	65	mΩ	$V_{GS} = -10\text{ V}, I_D = -1.8\text{ A}$
	$R_{DS(on)2}$		53	100	mΩ	$V_{GS} = -4.5\text{ V}, I_D = -1.8\text{ A}$
Input Capacitance	C_{iss}		880		pF	$V_{DS} = -10\text{ V}$
Output Capacitance	C_{oss}		150		pF	$V_{GS} = 0\text{ V}$
Reverse Transfer Capacitance	C_{rss}		115		pF	$f = 1\text{ MHz}$
Turn-on Delay Time	$t_{d(on)}$		9		ns	$V_{DD} = -20\text{ V}, I_D = -1.8\text{ A}$
Rise Time	t_r		4		ns	$V_{GS} = -10\text{ V}$
Turn-off Delay Time	$t_{d(off)}$		74		ns	$R_G = 10\ \Omega$
Fall Time	t_f		37		ns	
Total Gate Charge	Q_G		20		nC	$V_{DD} = -32\text{ V}$
Gate to Source Charge	Q_{GS}		3		nC	$V_{GS} = -10\text{ V}$
Gate to Drain Charge	Q_{GD}		5		nC	$I_D = -3.5\text{ A}$
Body Diode Forward Voltage *1	$V_{F(S-D)}$			1.5	V	$I_F = 3.5\text{ A}, V_{GS} = 0\text{ V}$
Reverse Recovery Time	t_{rr}		30		ns	$I_F = 3.5\text{ A}, V_{GS} = 0\text{ V}$
Reverse Recovery Charge	Q_{rr}		34		nC	$di/dt = 100\text{ A}/\mu\text{s}$

Note: *1 Pulsed

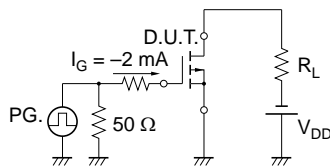
TEST CIRCUIT 1 AVALANCHE CAPABILITY



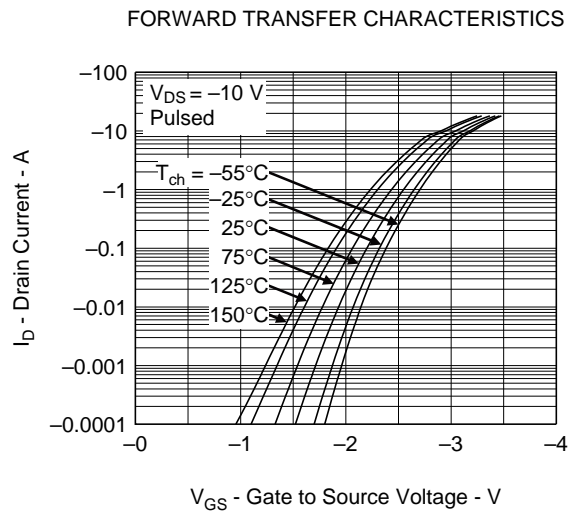
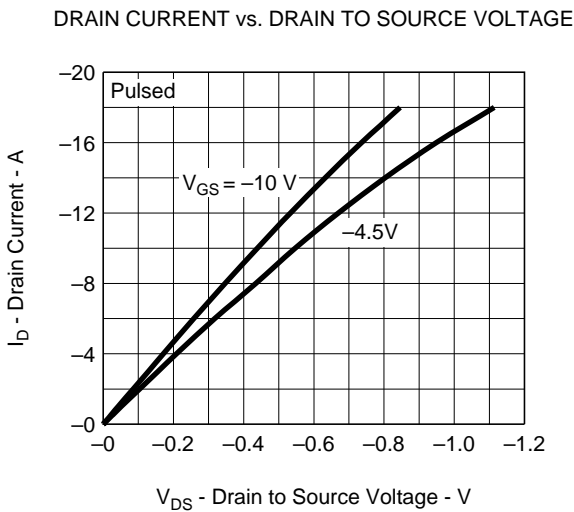
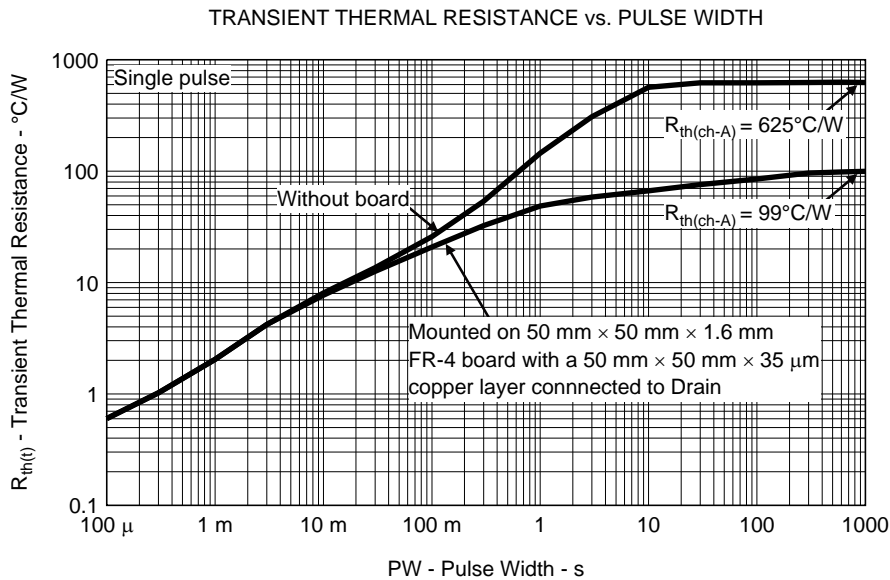
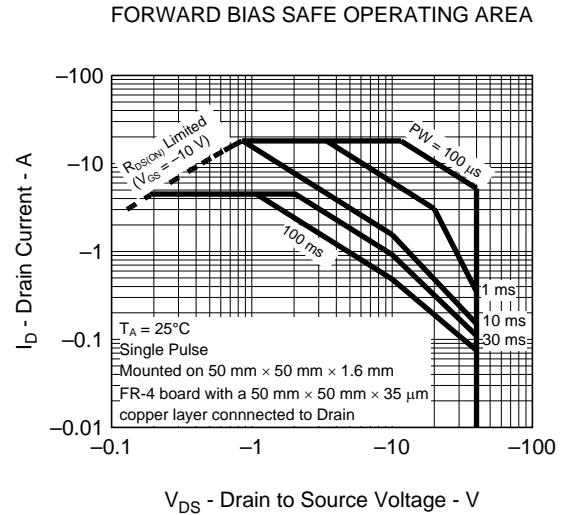
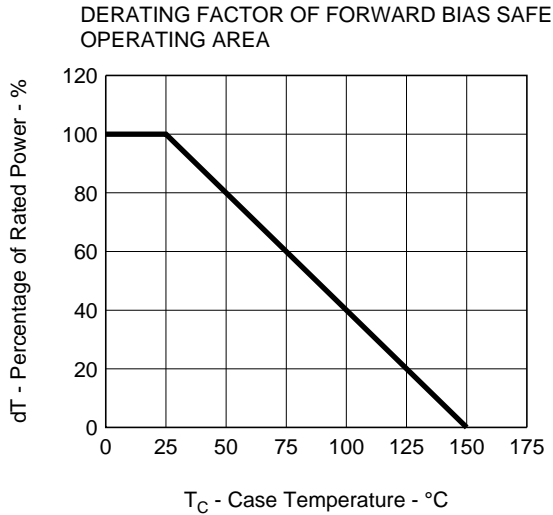
TEST CIRCUIT 2 SWITCHING TIME

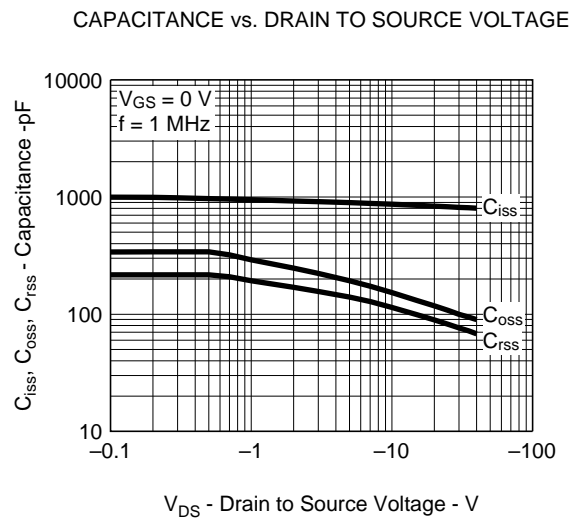
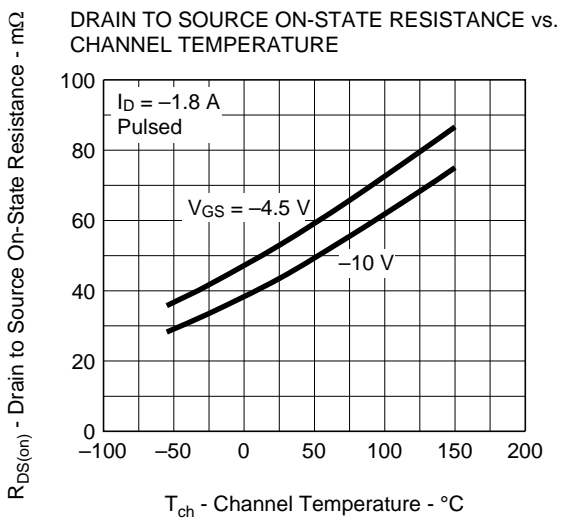
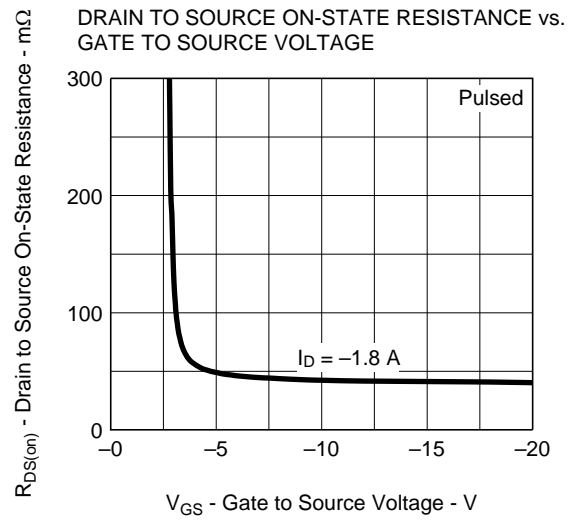
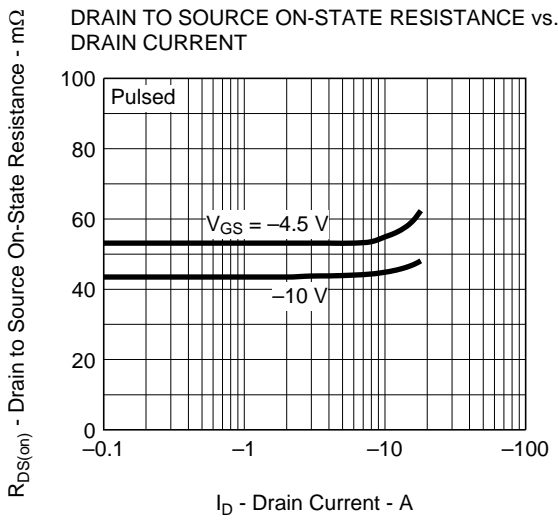
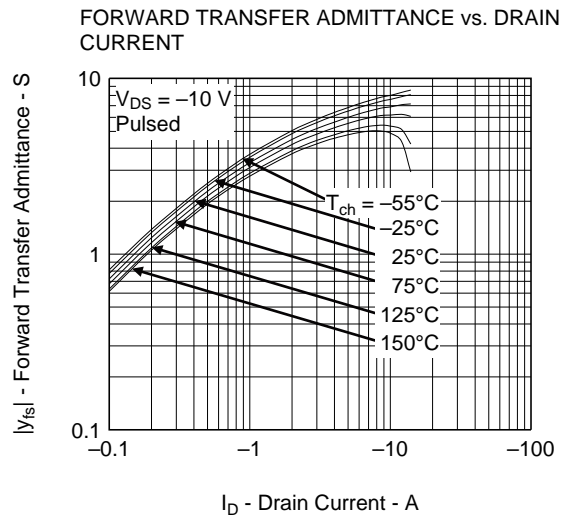
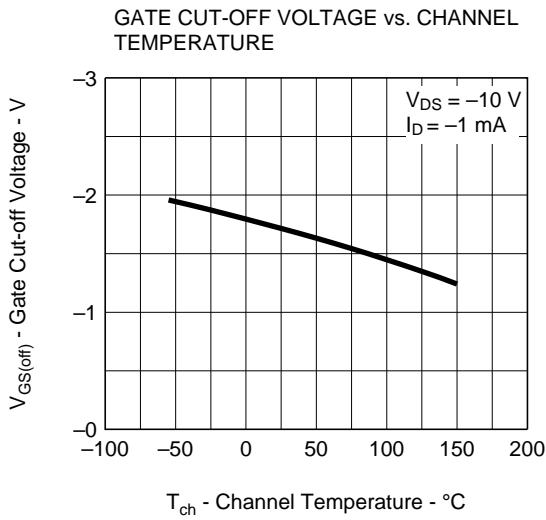


TEST CIRCUIT 3 GATE CHARGE

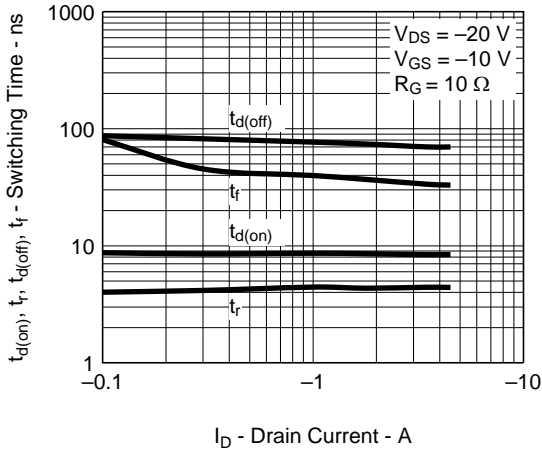


Typical Characteristics (T_A = 25°C)

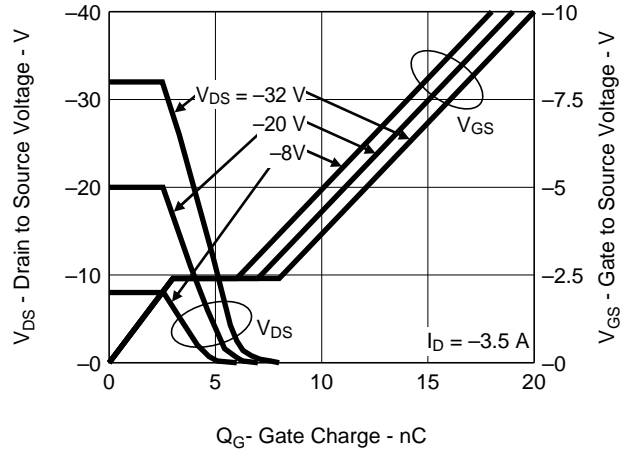




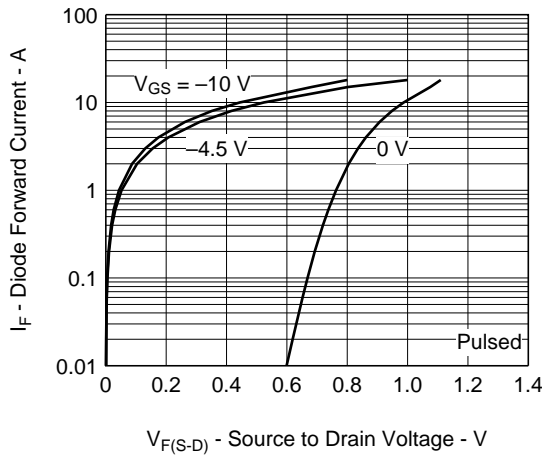
SWITCHING CHARACTERISTICS



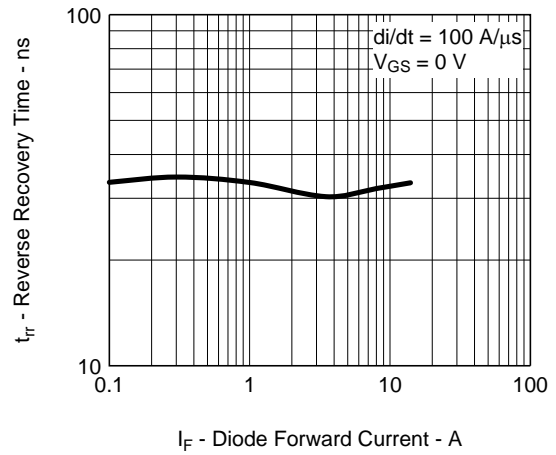
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

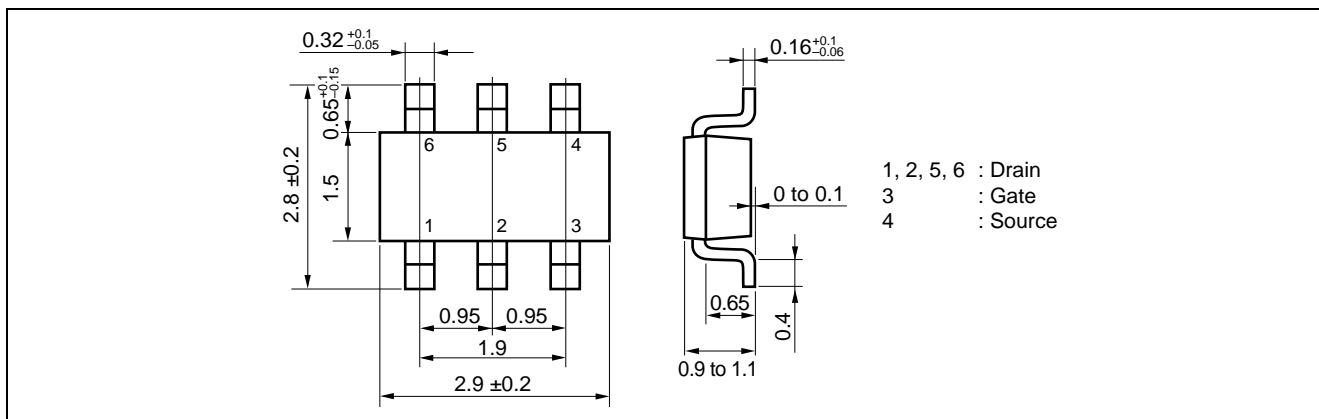


REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT

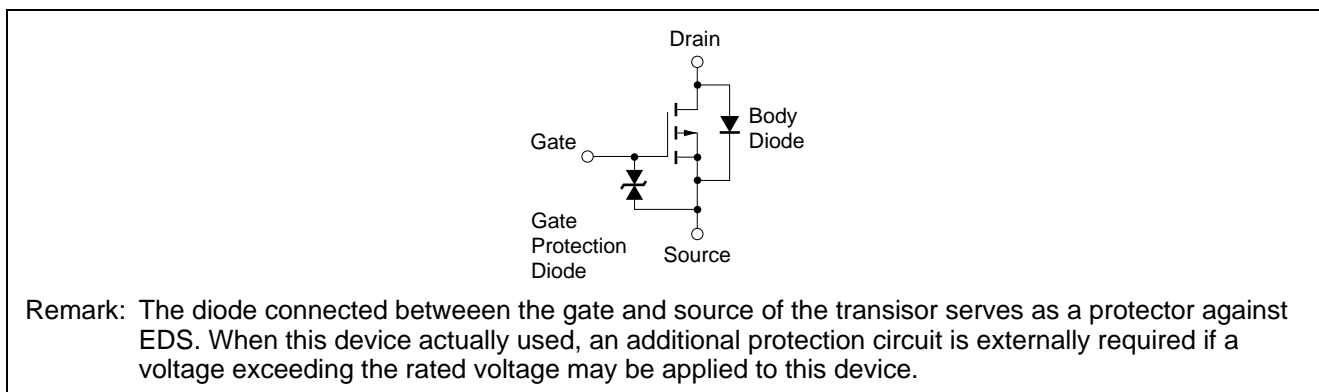


Package Drawings (Unit: mm)

SC-95 (Mini Mold Thin Type)



Equivalent Circuit



Revision History**μPA1931 Data Sheet**

Rev.	Date	Description	
		Page	Summary
1.00	Jun 01, 2010	—	First Edition Issued
1.01	Oct 20, 2010	P1	Taping code corrected
1.02	Mar 06, 2012	P1	A type in PT1 item name corrected.
		P3	A type corrected in legend of "TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH" graph.
1.03	May 09, 2012	P1, P2	Minor error correction of letters

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