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 mΩ MAX. (V_{GS} = −10 V, I_D = −1.8 A)
  - $R_{DS(on)2}$ = 100 mΩ MAX. (V_{GS} = −4.5 V, I_D = −1.8 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°C)

Item	Symbol	Ratings	Unit
Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	−40	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	∓20	V
Drain Current (DC) (T_A = 25°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	°C
Storage Temperature	T_{stg}	−55 to +150	°C
Single Avalanche Current *3	I_{AS}	3.5	A
Single Avalanche Energy *3	E_{AS}	1.2	mJ

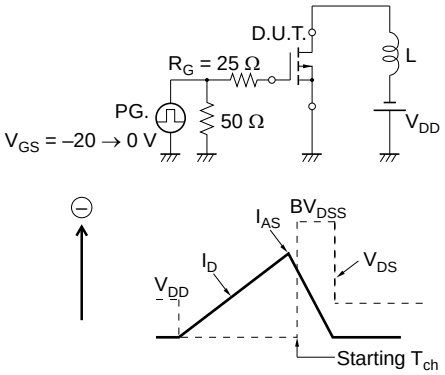
Notes: *1 $P_W \leq 10$ μs, Duty Cycle ≤ 1%
*2 Mounted on FR-4 board of 50 mm × 50 mm × 1.6 mmt, t ≤ 5 sec
*3 $T_{ch(peak)} \leq 150$°C, R_G = 25 Ω

Electrical Characteristics (T_A = 25°C)

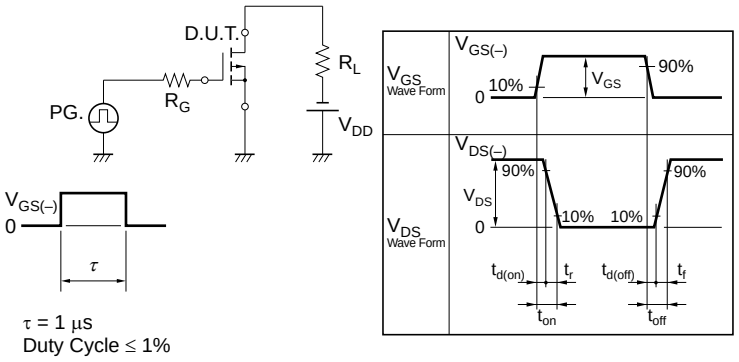
Item	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I_{DSS}			−10	μA	V_{DS} = −40 V, V_{GS} = 0 V
Gate Leakage Current	I_{GSS}			∓20	μA	V_{GS} = ∓20 V, V_{DS} = 0 V
Gate Cut-off Voltage	$V_{GS(off)}$	−1.0	−1.7	−2.5	V	V_{DS} = −10 V, I_D = −1 mA
Forward Transfer Admittance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

Note: *1 Pulsed

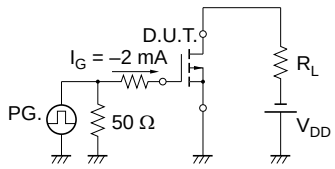
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

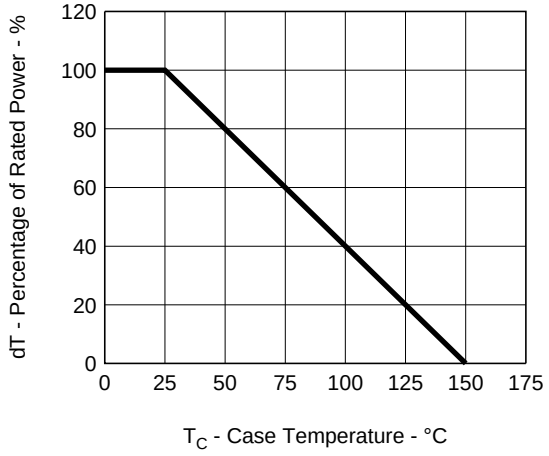


TEST CIRCUIT 3 GATE CHARGE

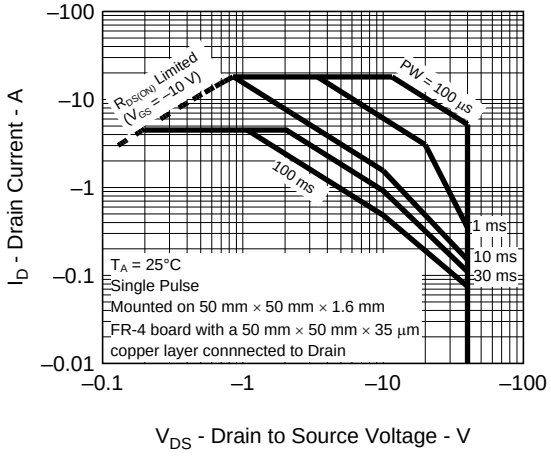


Typical Characteristics (T_A = 25°C)

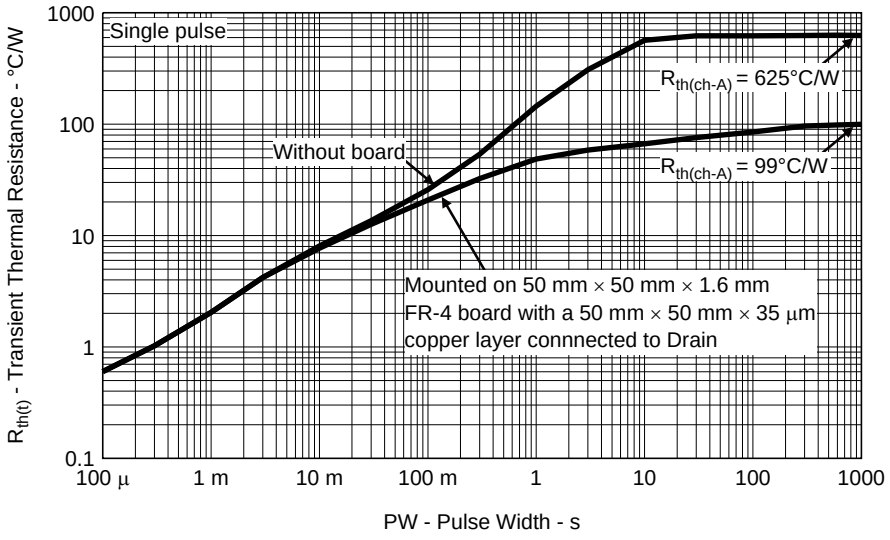
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



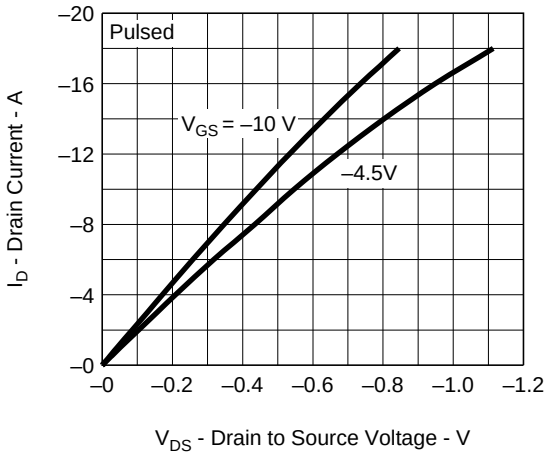
FORWARD BIAS SAFE OPERATING AREA



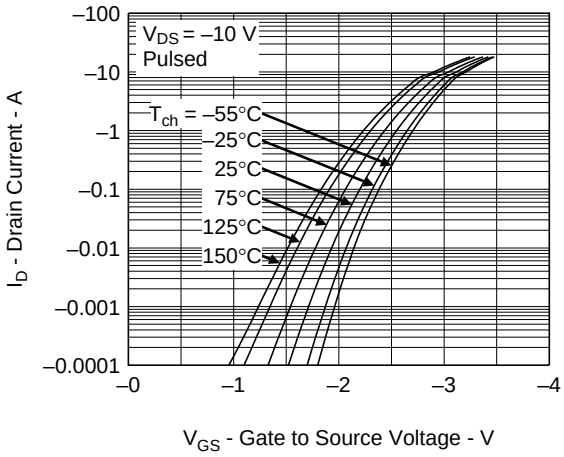
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



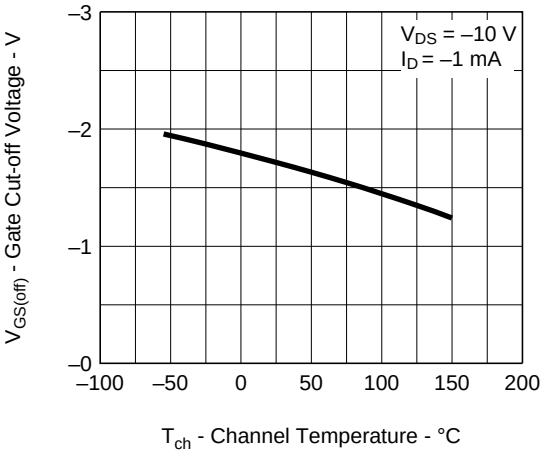
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



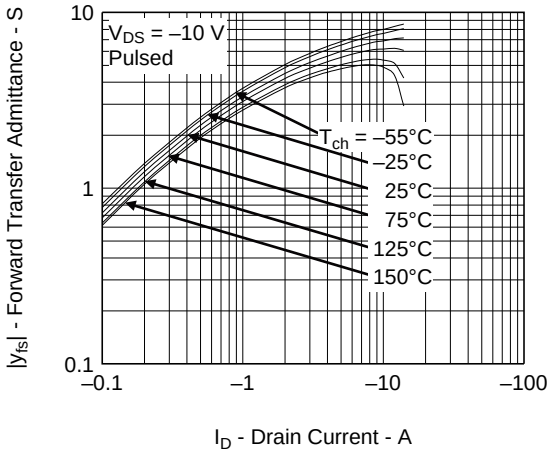
FORWARD TRANSFER CHARACTERISTICS



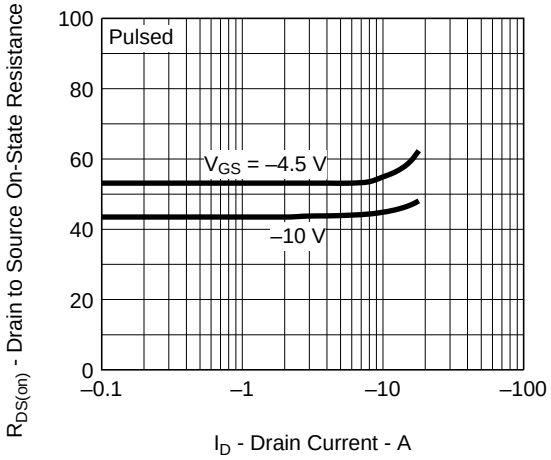
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



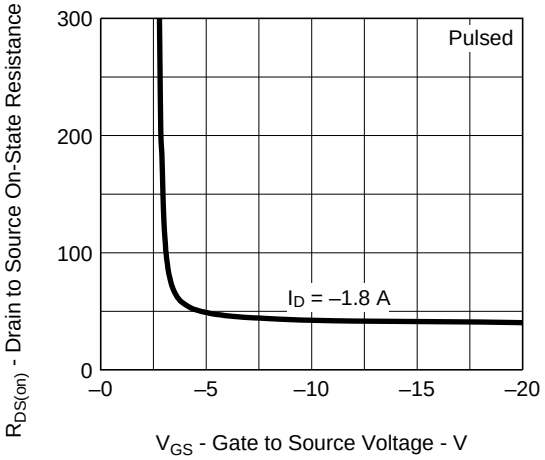
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



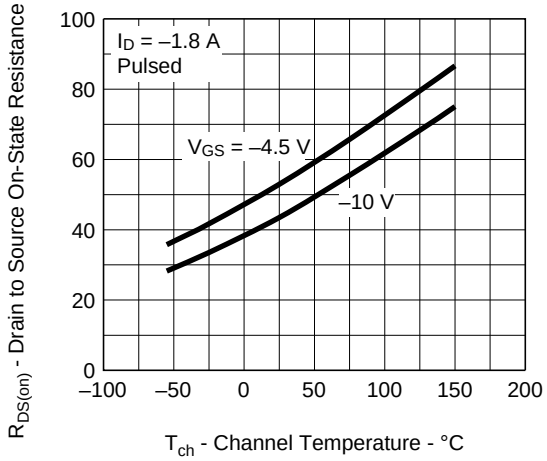
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



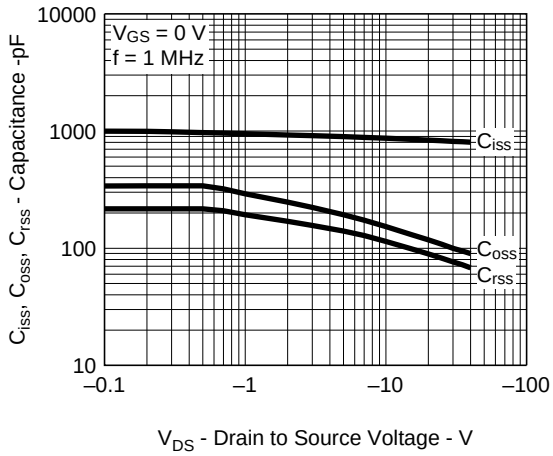
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



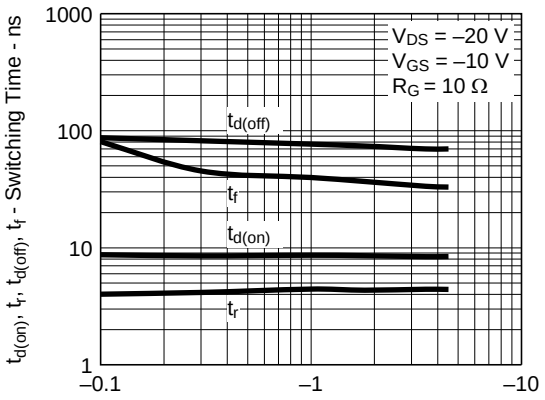
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



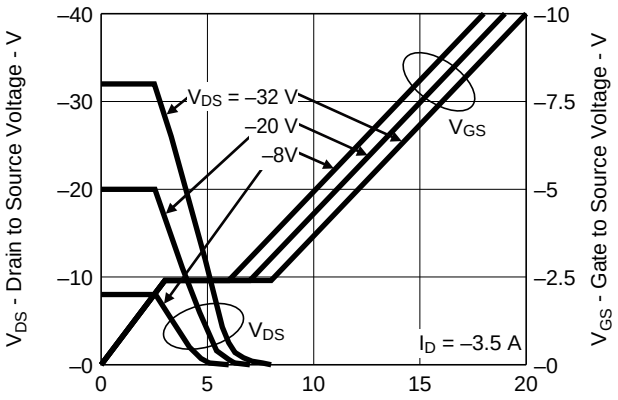
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



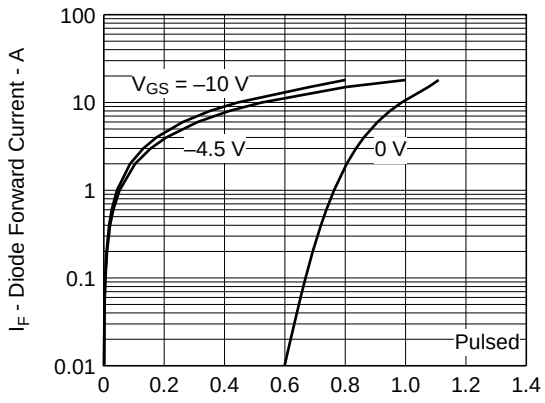
SWITCHING CHARACTERISTICS



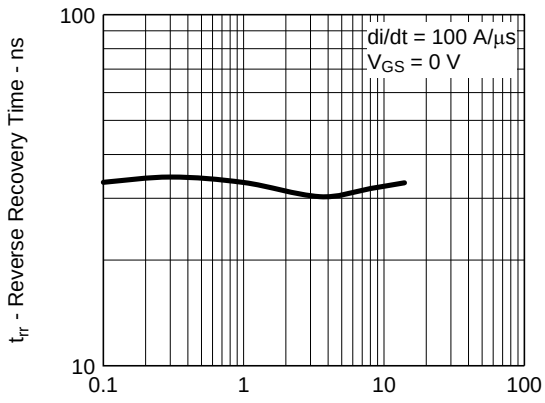
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

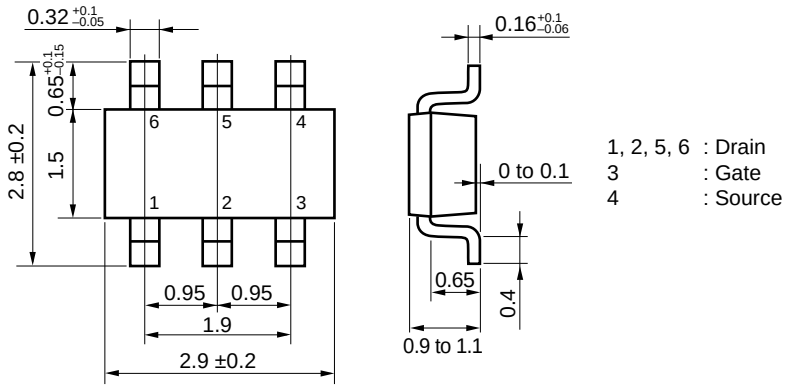


REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT

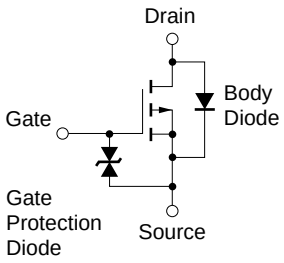


Package Drawings (Unit: mm)

SC-95 (Mini Mold Thin Type)



Equivalent Circuit



Remark: The diode connected betweeen the gate and source of the transisor serves as a protector against EDS. 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.

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 P3	A type in PT1 item name corrected. 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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Colophon 1.1