DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR

μPA2731T1A

SWITCHING
P-CHANNEL POWER MOSFET

DESCRIPTION

The μPA2731T1A is P-channel MOS Field Effect Transistor designed for power management applications of notebook computers and Li-ion battery protection circuit.

FEATURES

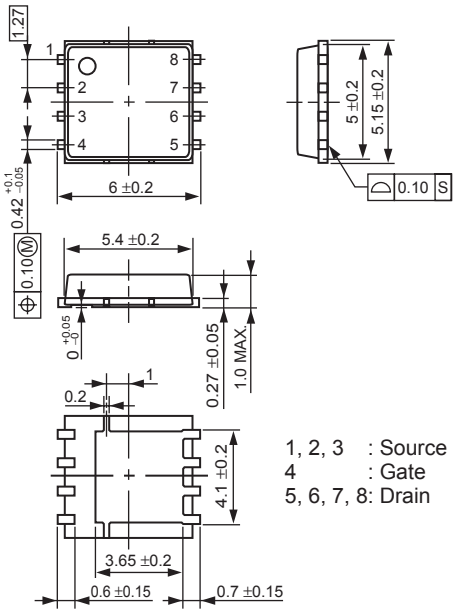
- Low on-state resistance
  $R_{DS(on)1}$ = 3.3 mΩ MAX. (V_{GS} = –10 V, I_D = –22 A)
  $R_{DS(on)2}$ = 6.4 mΩ MAX. (V_{GS} = –4.5 V, I_D = –22 A)
- Low C_{iss}: C_{iss} = 3620 pF TYP.
- Built-in gate protection diode
- Small and surface mount package (8pin HVSON)

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA2731T1A-E1-AZ [Note]	8pin HVSON
μPA2731T1A-E2-AZ [Note]	8pin HVSON

Note Pb-free (This product does not contain Pb in external electrode.)

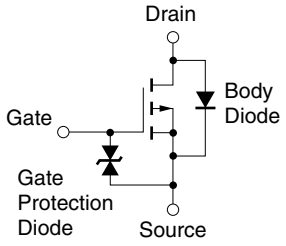
PACKAGE DRAWING (Unit: mm)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, All terminals are connected.)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	–30	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	∓20	V
Drain Current (DC)	$I_{D(DC)}$	∓44	A
Drain Current (pulse) [Note1]	$I_{D(pulse)}$	∓180	A
Total Power Dissipation [Note2]	P_{T1}	1.5	W
Total Power Dissipation (PW = 10 sec) [Note2]	P_{T2}	4.6	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C
Single Avalanche Current [Note3]	I_{AS}	–22	A
Single Avalanche Energy [Note3]	E_{AS}	48	mJ

EQUIVALENT CIRCUIT



Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Mounted on a glass epoxy board (25.4 mm x 25.4 mm x 0.8 mm)

3. Starting T_{ch} = 25°C, V_{DD} = –15 V, R_G = 25 Ω, L = 100 μH, V_{GS} = –20 → 0 V

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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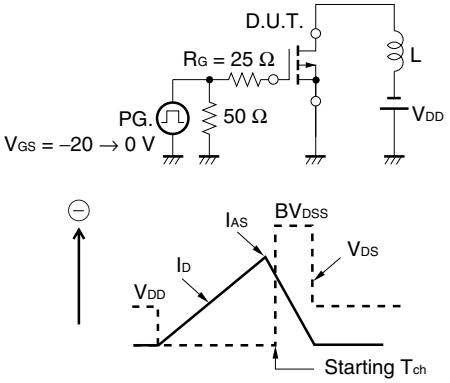
ELECTRICAL CHARACTERISTICS (T_A = 25°C, All terminals are connected.)

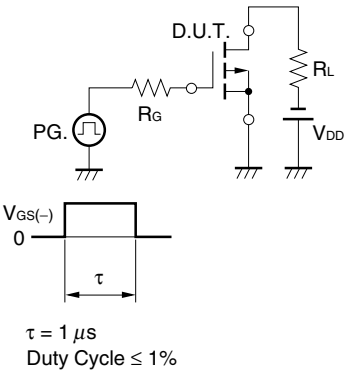
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –30 V, V_{GS} = 0 V			–1	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ∓20 V, V_{DS} = 0 V			∓10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = –10 V, I_D = –1 mA	–1.0		–2.5	V
Drain to Source On-state Resistance Note	$R_{DS(on)1}$	V_{GS} = –10 V, I_D = –22 A		2.6	3.3	mΩ
	$R_{DS(on)2}$	V_{GS} = –4.5 V, I_D = –22 A		4.2	6.4	mΩ
Input Capacitance	C_{iss}	V_{DS} = –10 V		3620		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		1540		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		630		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = –15 V, I_D = –22 A		15		ns
Rise Time	t_r	V_{GS} = –10 V		16		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		760		ns
Fall Time	t_f			510		ns
Total Gate Charge	Q_G	V_{DD} = –24 V		149		nC
Gate to Source Charge	Q_{GS}	V_{GS} = –10 V		17		nC
Gate to Drain Charge	Q_{GD}	I_D = –44 A		48		nC
Body Diode Forward Voltage Note	$V_{F(S-D)}$	I_F = 44 A, V_{GS} = 0 V		0.85		V
Reverse Recovery Time	t_{rr}	I_F = 44 A, V_{GS} = 0 V		87		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 50 A/μs		60		nC

Note Pulsed

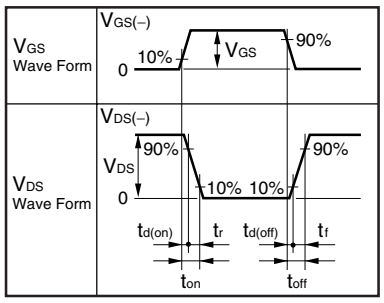
TEST CIRCUIT 1 AVALANCHE CAPABILITY



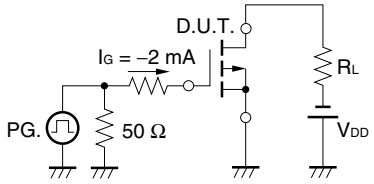
TEST CIRCUIT 2 SWITCHING TIME



τ = 1 μs
Duty Cycle ≤ 1%

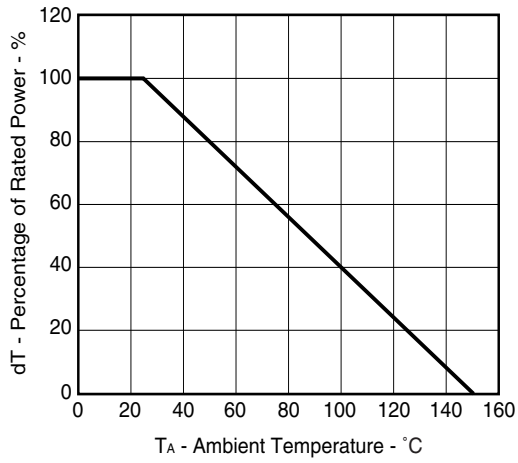


TEST CIRCUIT 3 GATE CHARGE

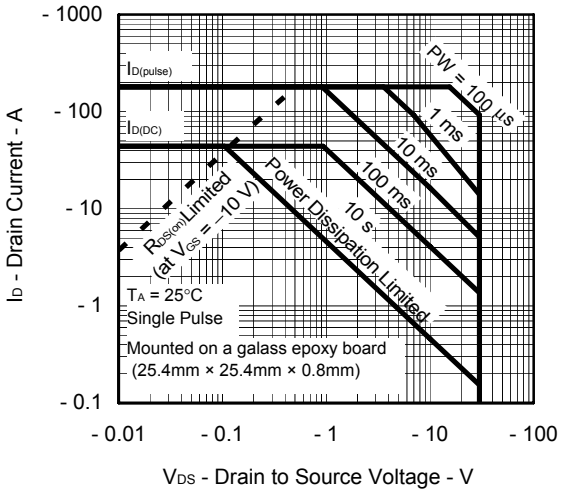


TYPICAL CHARACTERISTICS (T_A = 25°C)

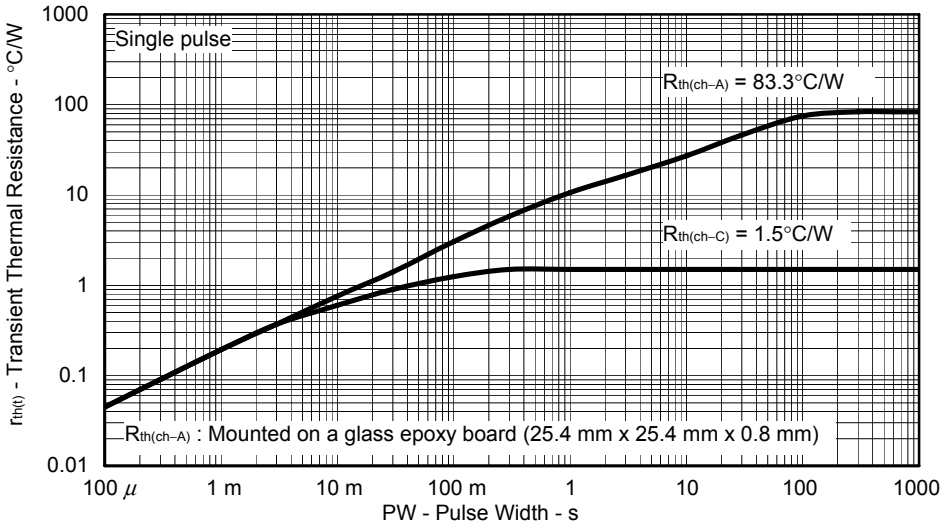
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



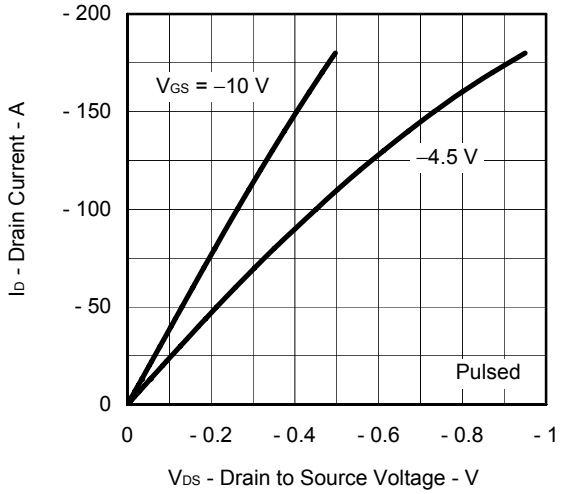
FORWARD BIAS SAFE OPERATING AREA



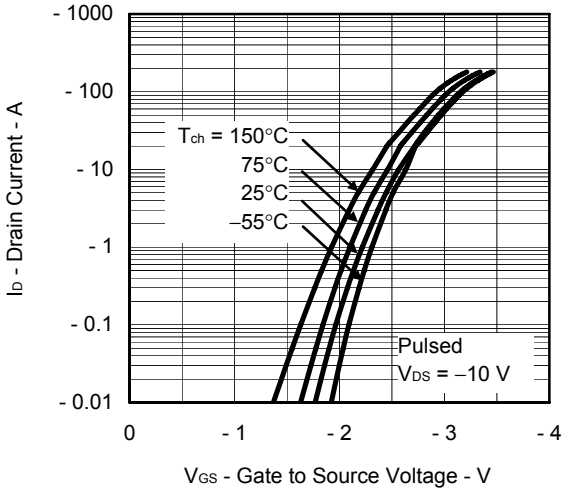
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



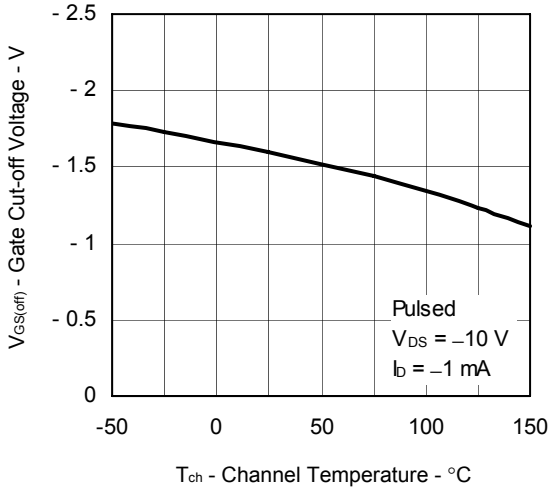
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



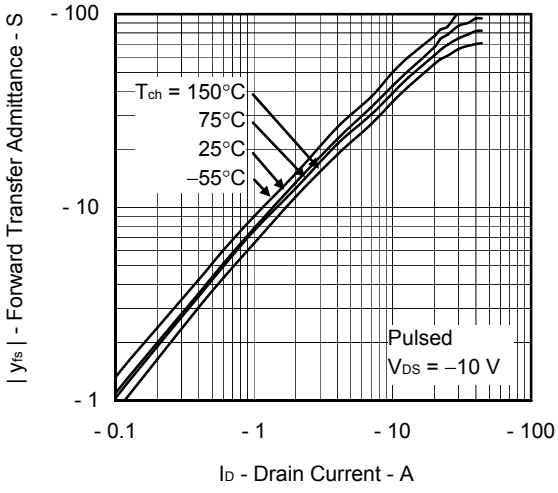
FORWARD TRANSFER CHARACTERISTICS



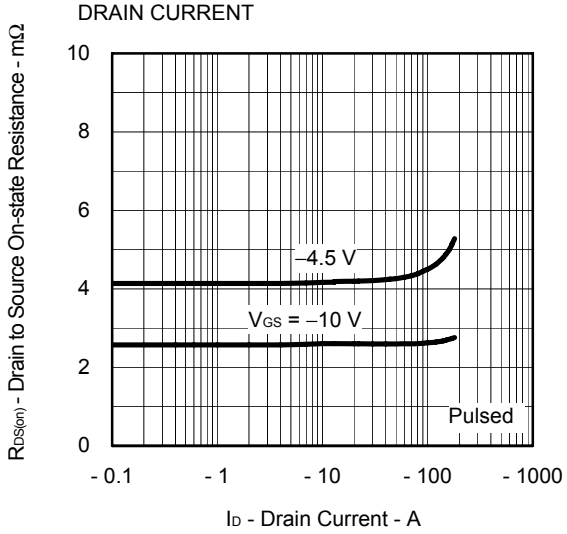
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



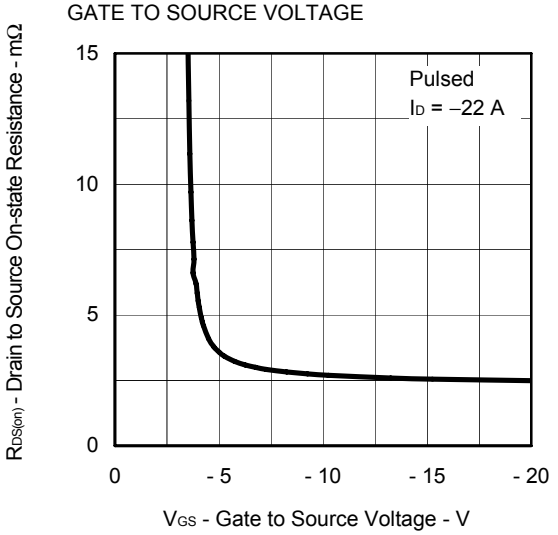
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



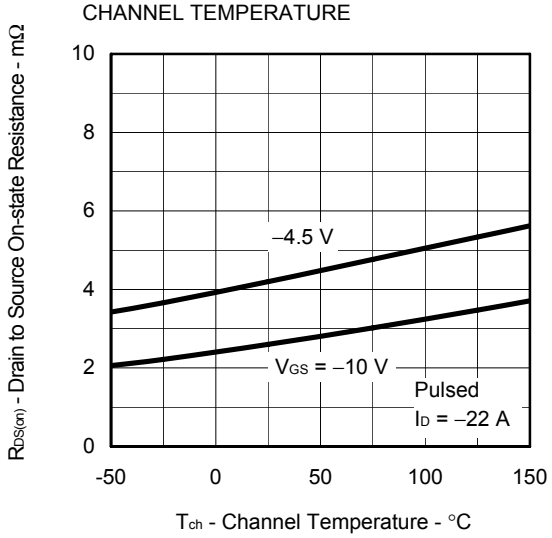
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



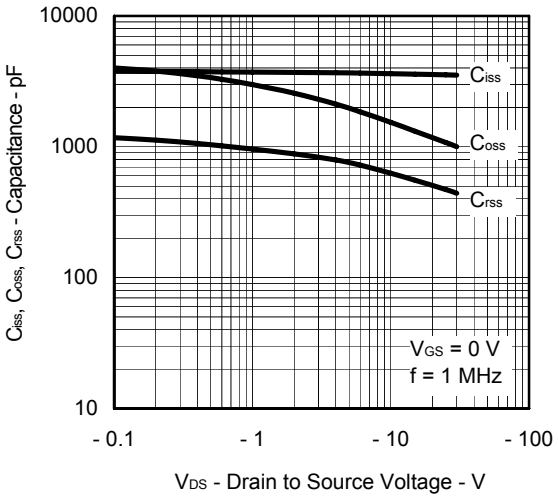
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



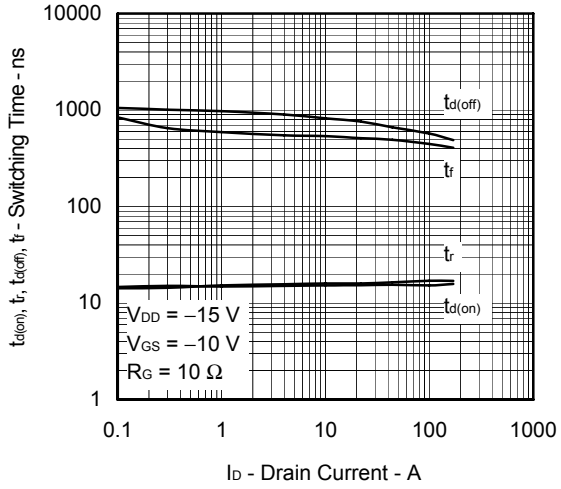
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



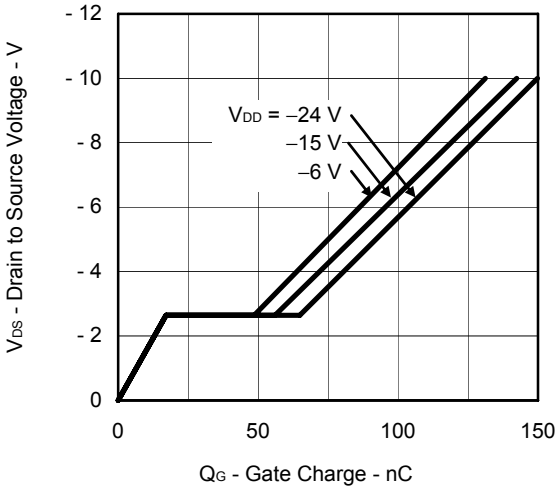
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



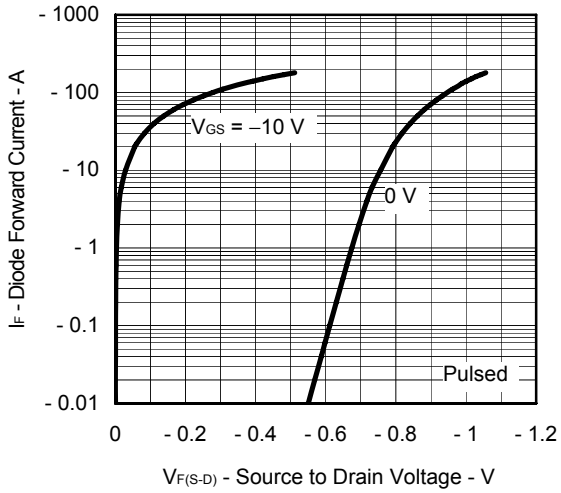
SWITCHING CHARACTERISTICS



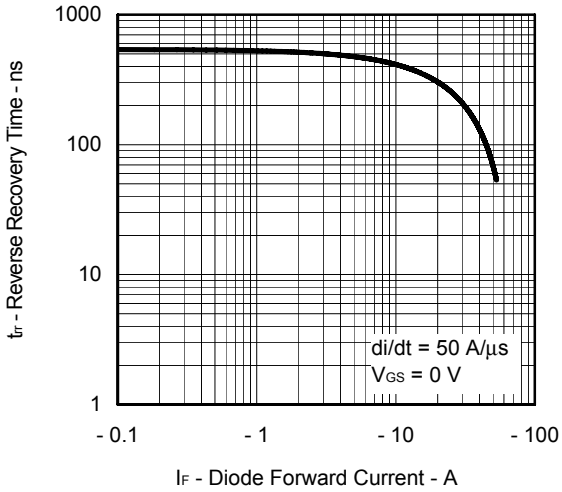
DYNAMIC INPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME vs.
DIODE FORWARD CURRENT



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