

# MOS FIELD EFFECT TRANSISTOR

# $\mu$ PA2722T1A

## SWITCHING

## N-CHANNEL POWER MOSFET

### DESCRIPTION

The  $\mu$ PA2722T1A is N-channel MOSFET designed for DC/DC converter applications.

### FEATURES

- Low on-state resistance  
 $R_{DS(on)1} = 3.3 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 15 \text{ A)}$   
 $R_{DS(on)2} = 4.6 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 15 \text{ A)}$
- Built-in gate protection diode
- Thin type surface mount package with heat spreader (8-pin HVSON)
- RoHS Compliant

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ , All terminals are connected.)

Drain to Source Voltage ( $V_{GS} = 0 \text{ V}$ )	$V_{DSS}$	30	V
Gate to Source Voltage ( $V_{DS} = 0 \text{ V}$ )	$V_{GSS}$	$\pm 20$	V
Drain Current (DC)	$I_{D(DC)}$	$\pm 29$	A
Drain Current (pulse) <sup>Note1</sup>	$I_{D(pulse)}$	$\pm 170$	A
Total Power Dissipation <sup>Note2</sup>	$P_{T1}$	1.5	W
Total Power Dissipation ( $PW = 10 \text{ sec}$ ) <sup>Note2</sup>	$P_{T2}$	4.6	W
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	$-55 \text{ to } +150$	$^\circ\text{C}$
Single Avalanche Current <sup>Note3</sup>	$I_{AS}$	29	A
Single Avalanche Energy <sup>Note3</sup>	$E_{AS}$	84	mJ

### THERMAL RESISTANCE

Channel to Ambient Thermal Resistance <sup>Note2</sup>	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$
Channel to Case (Drain) Thermal Resistance	$R_{th(ch-C)}$	1.5	$^\circ\text{C/W}$

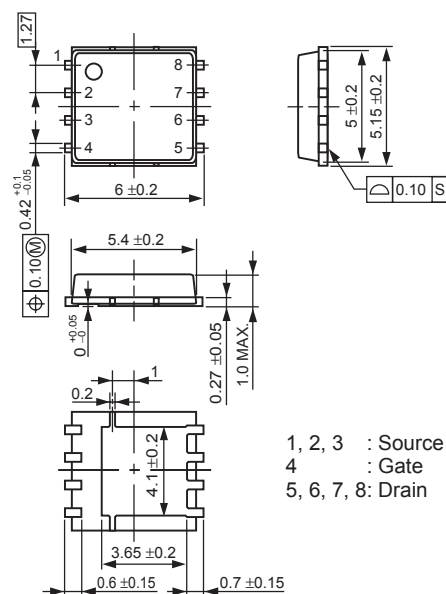
**Notes 1.**  $PW \leq 10 \mu\text{s}$ , Duty Cycle  $\leq 1\%$

**2.** Mounted on a glass epoxy board of 25.4 mm x 25.4 mm x 0.8 mm

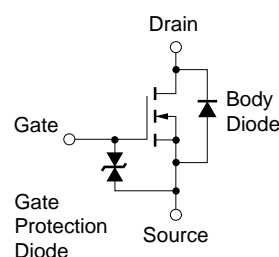
**3.** Starting  $T_{ch} = 25^\circ\text{C}$ ,  $V_{DD} = 15 \text{ V}$ ,  $R_G = 25 \Omega$ ,  $V_{GS} = 20 \rightarrow 0 \text{ V}$ ,  $L = 100 \mu\text{H}$

**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.

### PACKAGE DRAWING (Unit: mm)



### EQUIVALENT CIRCUIT



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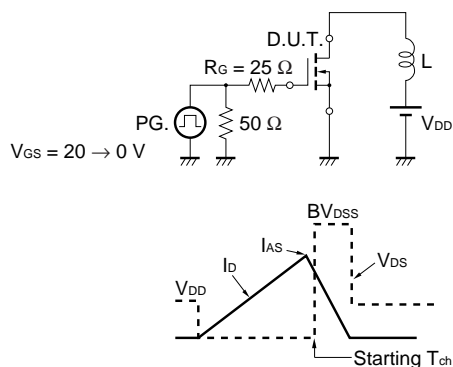
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**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, All terminals are connected.)**

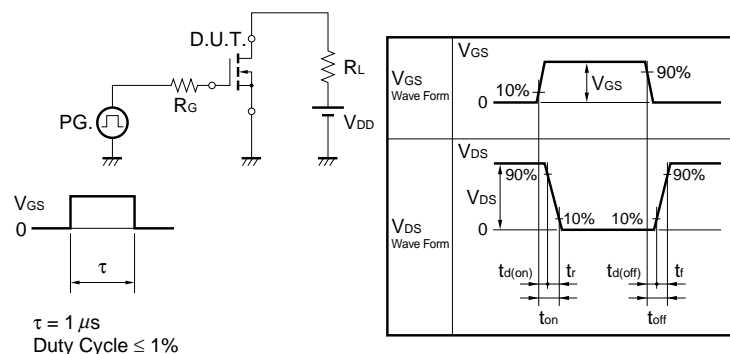
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V			10	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V			±10	μA
Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	1.0		2.5	V
Forward Transfer Admittance <sup>Note</sup>	y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 15 A	13			S
Drain to Source On-state Resistance <sup>Note</sup>	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A		2.4	3.3	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 15 A		3.4	4.6	mΩ
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 15 V,		6200		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V,		800		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1 MHz		410		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, I <sub>D</sub> = 15 A,		31		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = 10 V,		20		ns
Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>G</sub> = 10 Ω		129		ns
Fall Time	t <sub>f</sub>			40		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DD</sub> = 15 V,		46		nC
Gate to Source Charge	Q <sub>GS</sub>	V <sub>GS</sub> = 5 V,		17		nC
Gate to Drain Charge	Q <sub>GD</sub>	I <sub>D</sub> = 29 A		18		nC
Body Diode Forward Voltage <sup>Note</sup>	V <sub>F(S-D)</sub>	I <sub>F</sub> = 29 A, V <sub>GS</sub> = 0 V		0.8		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 29 A, V <sub>GS</sub> = 0 V,		44		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100 A/μs		44		nC
Gate Resistance	R <sub>G</sub>	f = 1 MHz		1.4		Ω

**Note** Pulsed

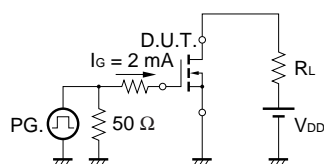
**TEST CIRCUIT 1 AVALANCHE CAPABILITY**



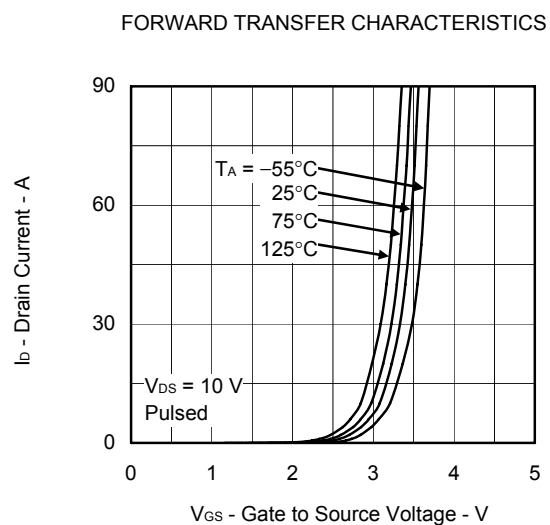
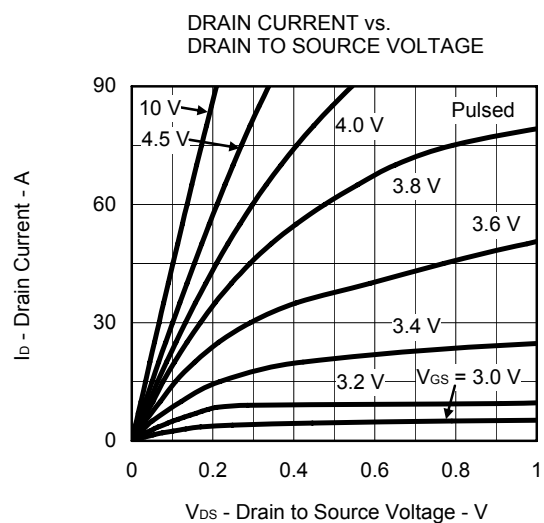
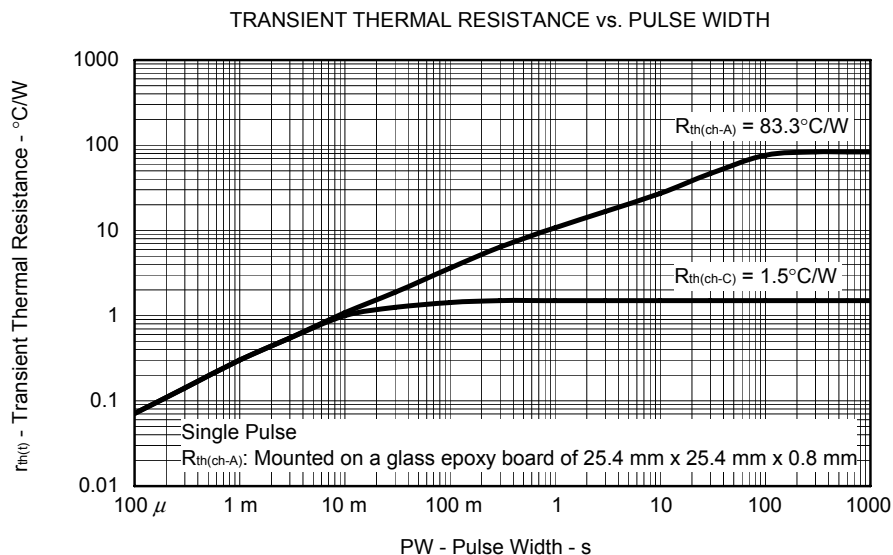
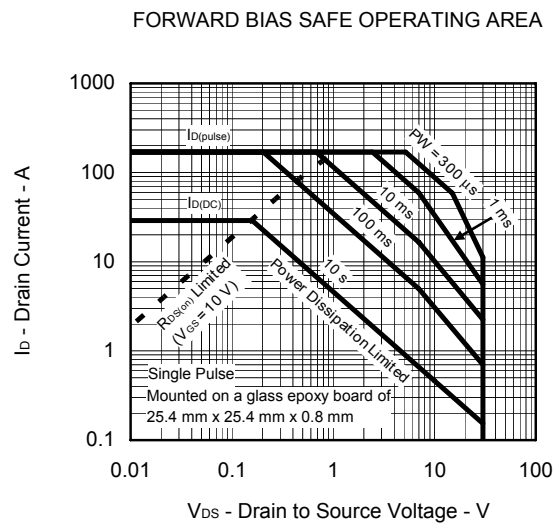
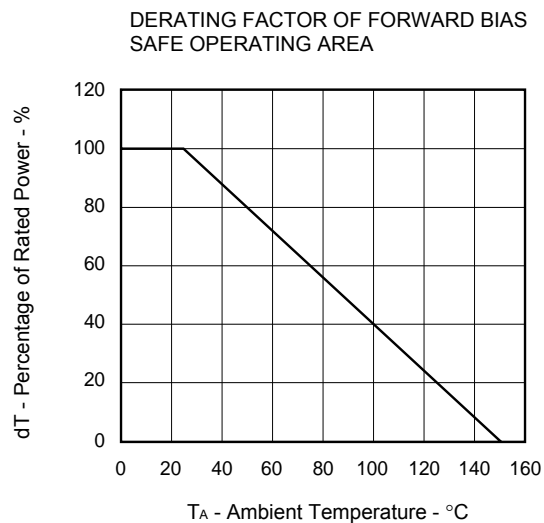
**TEST CIRCUIT 2 SWITCHING TIME**



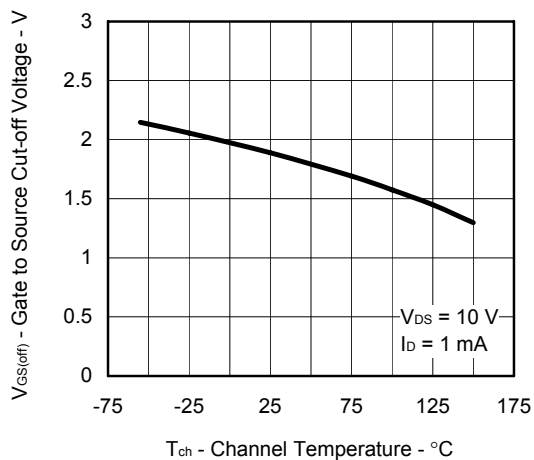
**TEST CIRCUIT 3 GATE CHARGE**



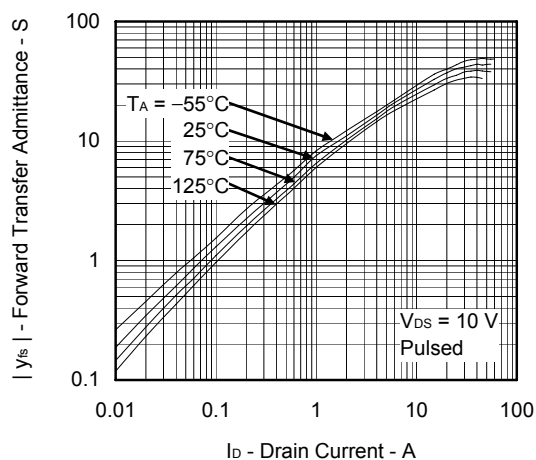
TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



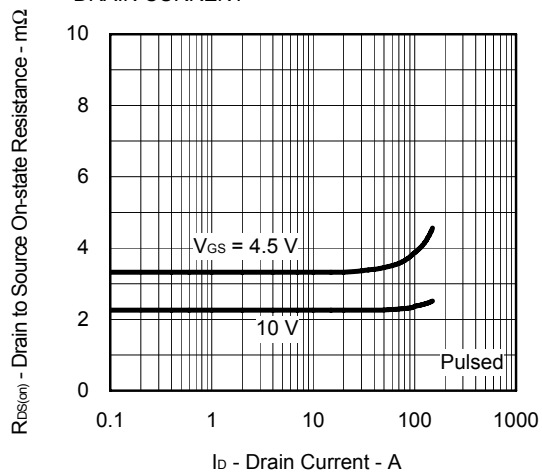
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



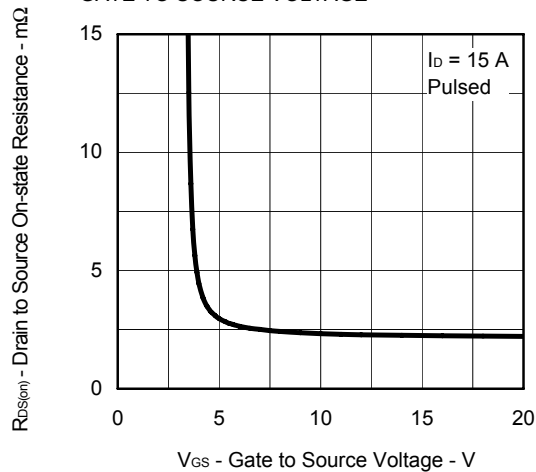
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



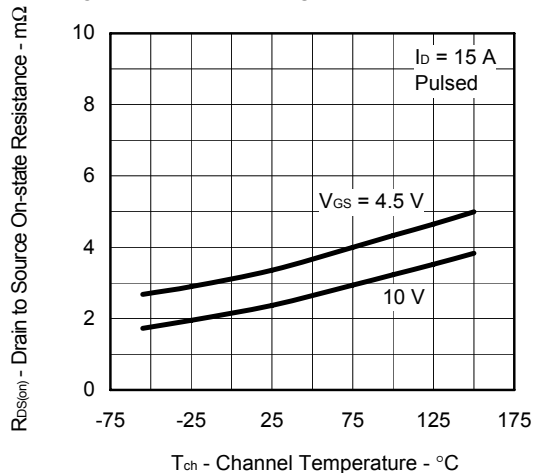
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



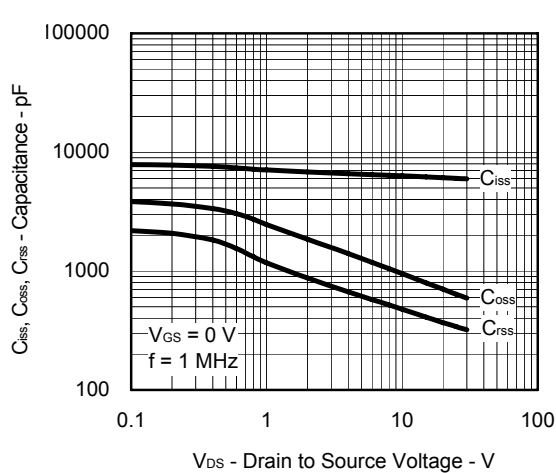
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



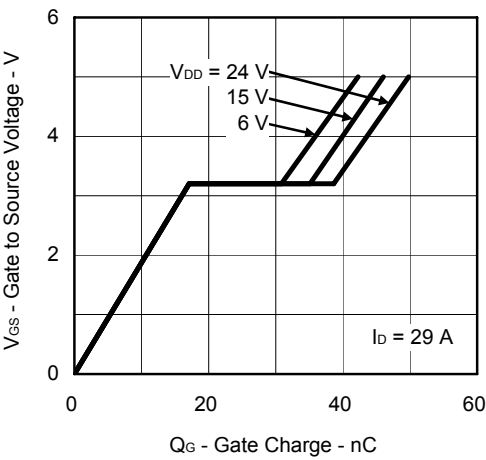
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



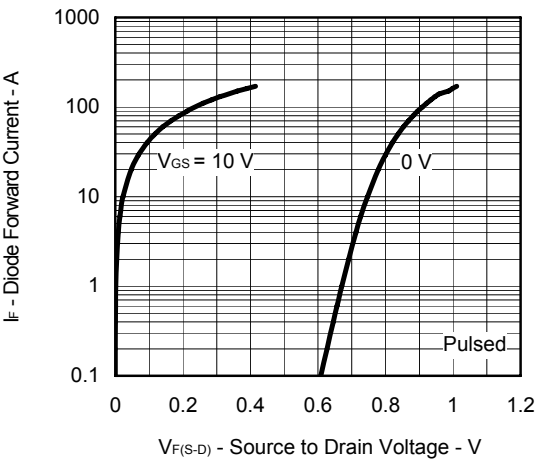
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



ORDERING INFORMATION

PART NUMBER	LEAD PLATING	PACKING	PACKAGE
$\mu$ PA2722T1A-E1-AZ <sup>Note</sup>	Sn-Bi	Tape 3000 p/reel	8-pin HVSON 0.10 g TYP.
$\mu$ PA2722T1A-E2-AZ <sup>Note</sup>			
$\mu$ PA2722T1A-E1-AY <sup>Note</sup>	Pure Sn		
$\mu$ PA2722T1A-E2-AY <sup>Note</sup>			

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

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