

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# MOS FIELD EFFECT TRANSISTOR

# $\mu$ PA2719AGR

## SWITCHING

### P-CHANNEL POWER MOS FET

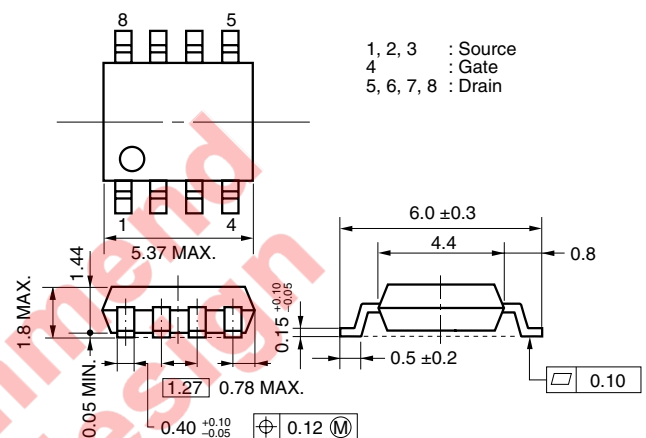
#### DESCRIPTION

The  $\mu$ PA2719AGR is P-Channel MOS Field Effect Transistor designed for power management applications of notebook computers and Lithium-Ion battery protection circuit.

#### FEATURES

- Low on-state resistance  
 $R_{DS(on)1} = 13 \text{ m}\Omega \text{ MAX. (} V_{GS} = -10 \text{ V, } I_D = -5.0 \text{ A)}$   
 $R_{DS(on)2} = 20.9 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5 \text{ V, } I_D = -5.0 \text{ A)}$
- Low input capacitance  
 $C_{iss} = 2010 \text{ pF TYP.}$
- Built-in gate protection diode
- Small and surface mount package (Power SOP8)

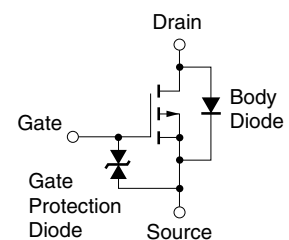
#### PACKAGE DRAWING (Unit: mm)



#### 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)	$I_{D(DC)}$	$\pm 10$	A
Drain Current (pulse) <sup>Note1</sup>	$I_{D(pulse)}$	$\pm 100$	A
Total Power Dissipation <sup>Note2</sup>	$P_{T1}$	2	W
Total Power Dissipation <sup>Note3</sup>	$P_{T2}$	2	W
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Single Avalanche Current <sup>Note4</sup>	$I_{AS}$	-10	A
Single Avalanche Energy <sup>Note4</sup>	$E_{AS}$	10	mJ

#### EQUIVALENT CIRCUIT



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

2. Mounted on ceramic substrate of  $1200 \text{ mm}^2 \times 2.2 \text{ mm}$
3. Mounted on glass epoxy board of  $25.4 \text{ mm} \times 25.4 \text{ mm} \times 0.8 \text{ mm}$ ,  $PW = 10 \text{ sec}$
4. Starting  $T_{ch} = 25^\circ\text{C}$ ,  $V_{DD} = -15 \text{ V}$ ,  $R_G = 25 \Omega$ ,  $L = 100 \mu\text{H}$ ,  $V_{GS} = -20 \rightarrow 0 \text{ V}$

**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.

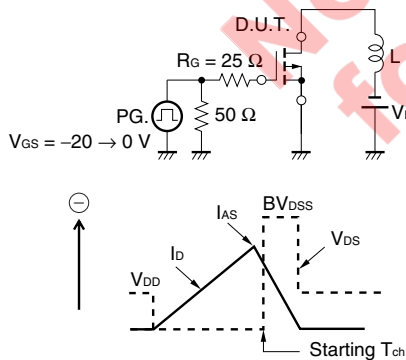
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**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, All terminals are connected.)**

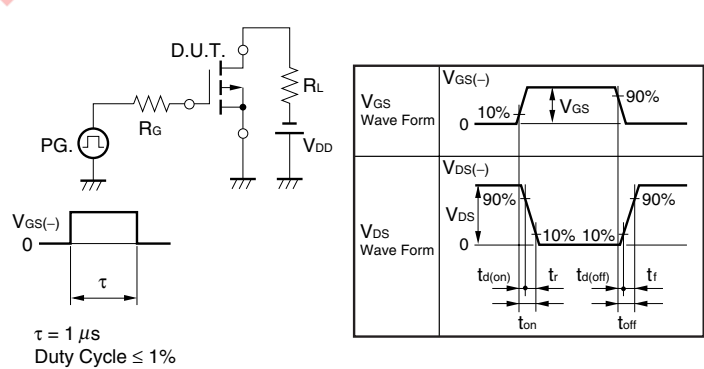
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V			-1	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V			±10	μA
Gate to Source Cut-off Voltage	V <sub>GS(off)</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> = -5.0 A	8			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> = -5.0 A		10.6	13	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -5.0 A		14.2	20.9	mΩ
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = -4.0 V, I <sub>D</sub> = -5.0 A		16.6	25.5	mΩ
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -10 V		2010		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		460		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1 MHz		350		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -15 V, I <sub>D</sub> = -5.0 A		12		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = -10 V		15		ns
Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>G</sub> = 10 Ω		290		ns
Fall Time	t <sub>f</sub>			180		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DD</sub> = -24 V		43		nC
Gate to Source Charge	Q <sub>GS</sub>	V <sub>GS</sub> = -10 V		5.5		nC
Gate to Drain Charge	Q <sub>GD</sub>	I <sub>D</sub> = -10 A		12		nC
Body Diode Forward Voltage <sup>Note</sup>	V <sub>F(S-D)</sub>	I <sub>F</sub> = 10 A, V <sub>GS</sub> = 0 V		0.84		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 10 A, V <sub>GS</sub> = 0 V		105		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 50 A/μs		6.7		nC

**Note** Pulsed

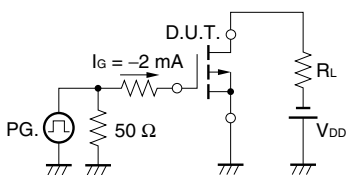
**TEST CIRCUIT 1 AVALANCHE CAPABILITY**



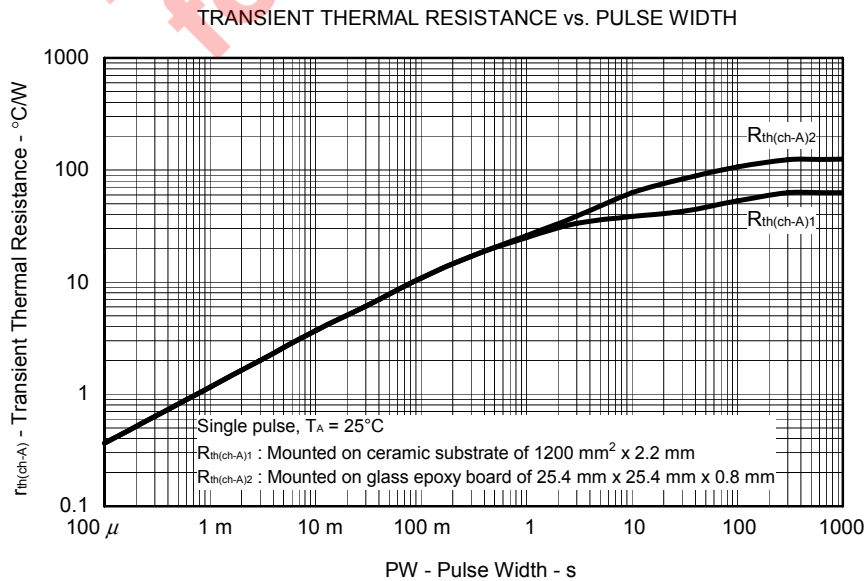
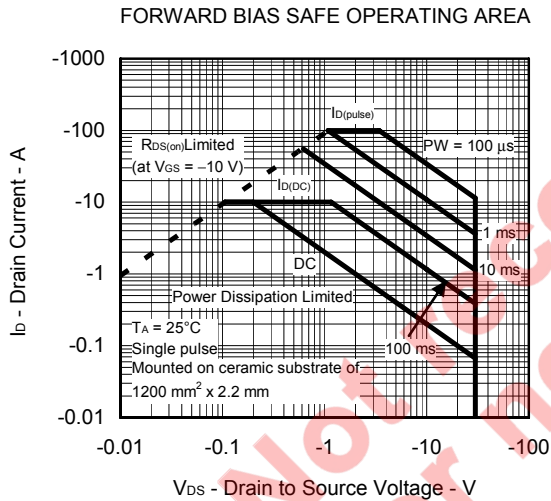
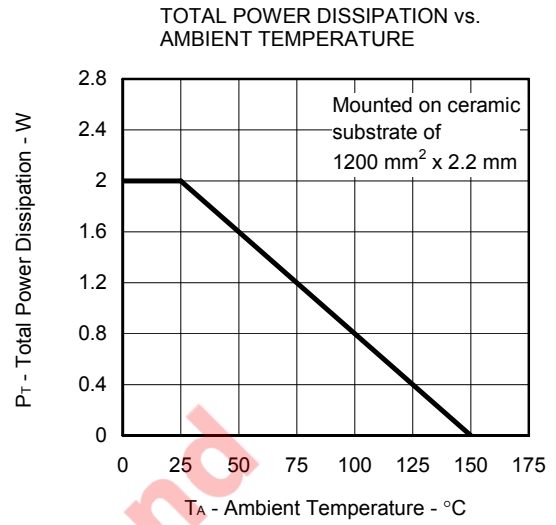
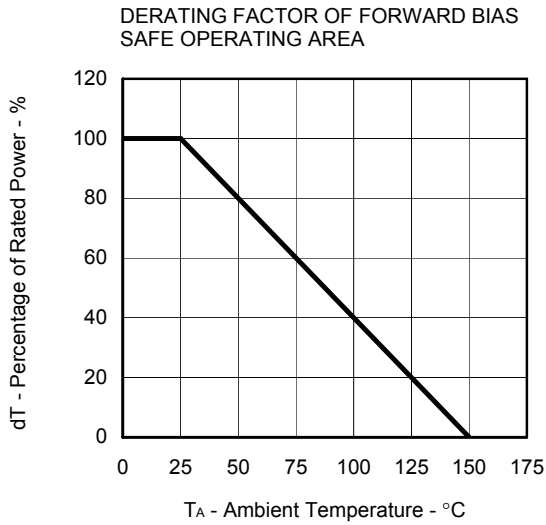
**TEST CIRCUIT 2 SWITCHING TIME**



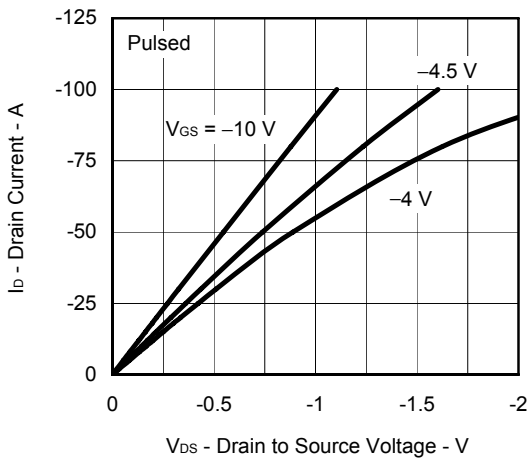
**TEST CIRCUIT 3 GATE CHARGE**



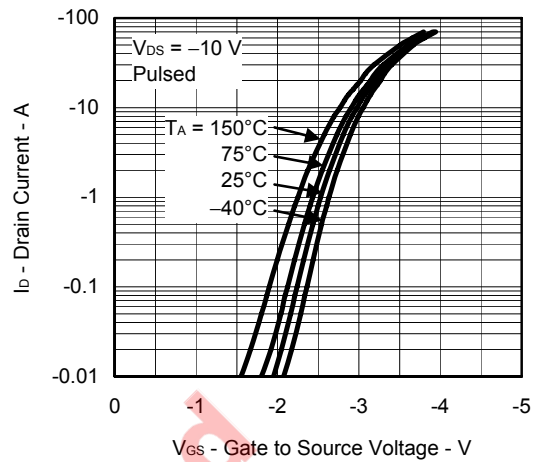
ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



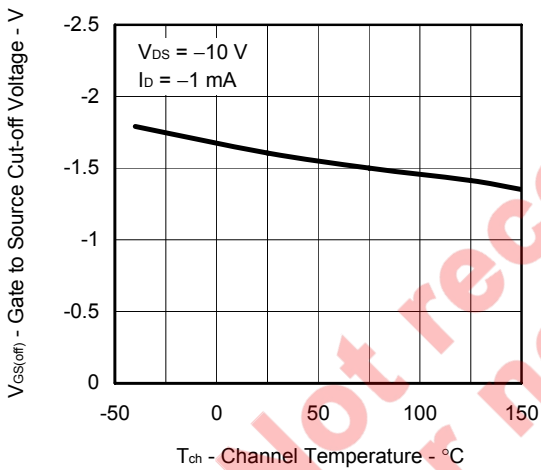
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



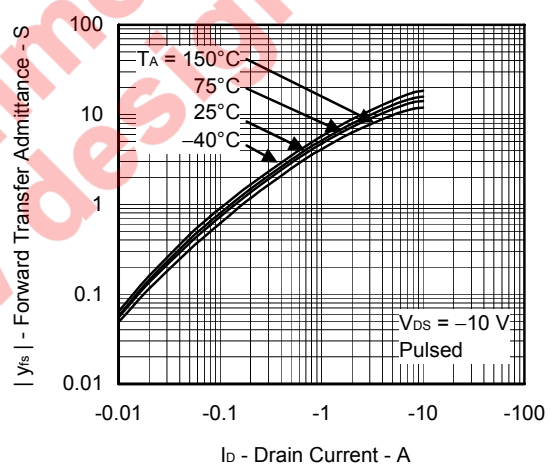
FORWARD TRANSFER CHARACTERISTICS



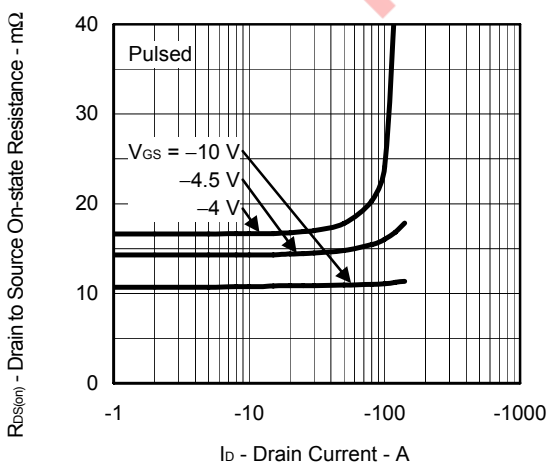
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



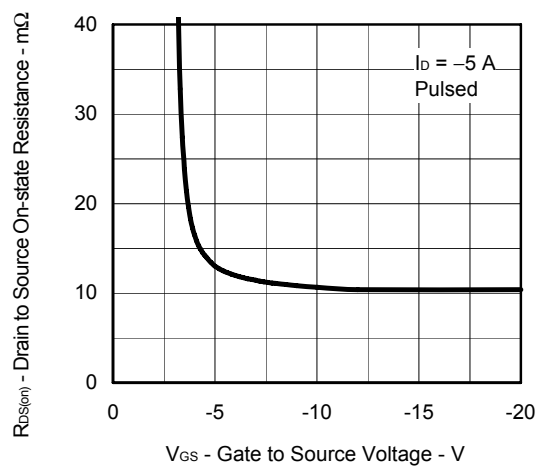
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



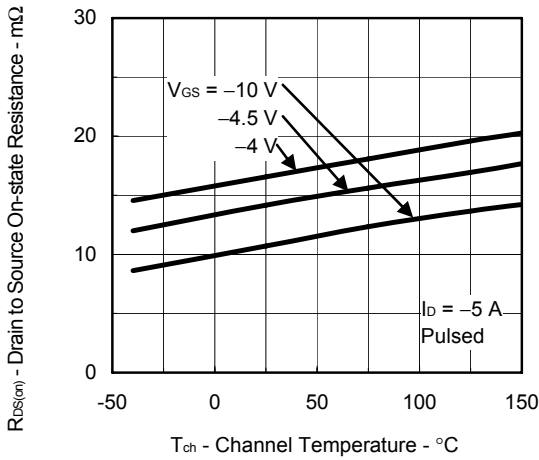
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



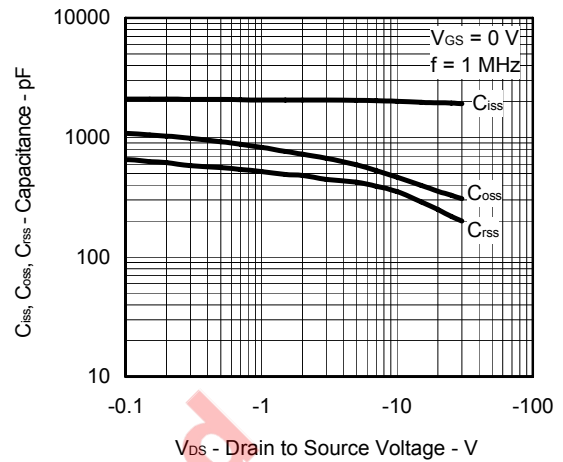
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



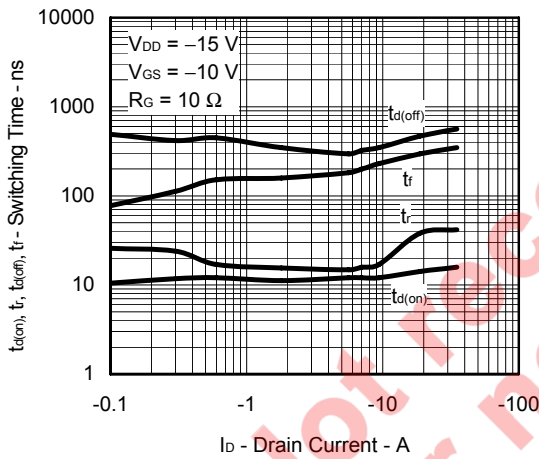
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



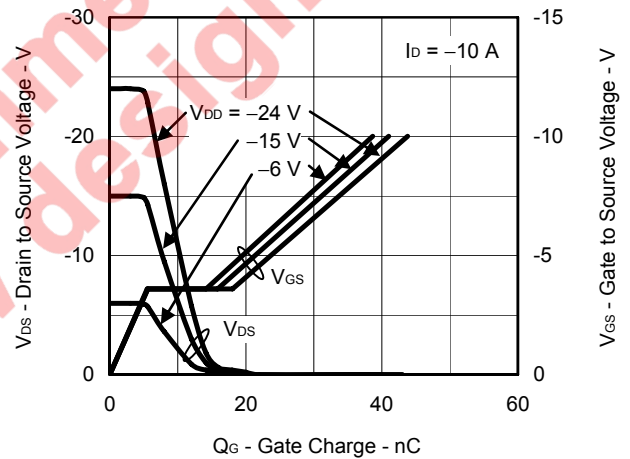
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



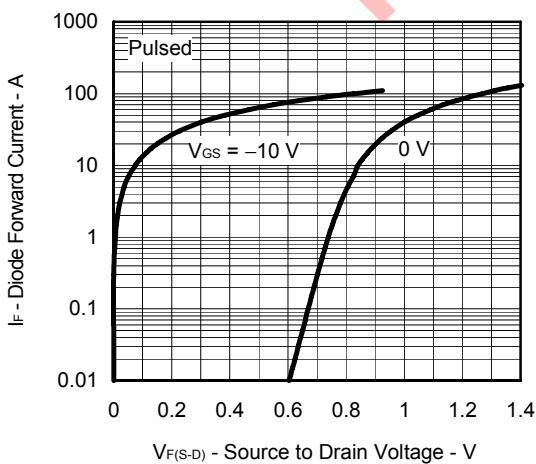
SWITCHING CHARACTERISTICS



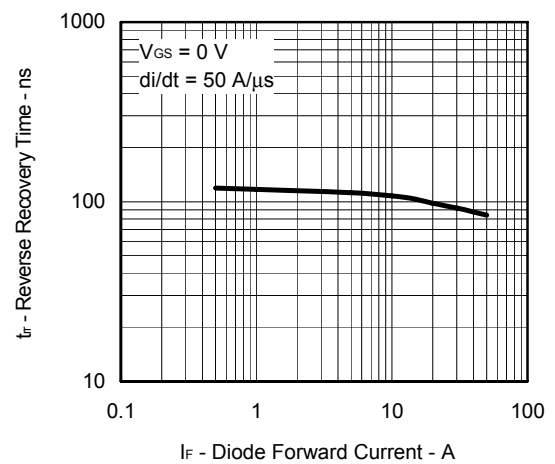
DYNAMIC INPUT/OUTPUT CHARACTERISTICS

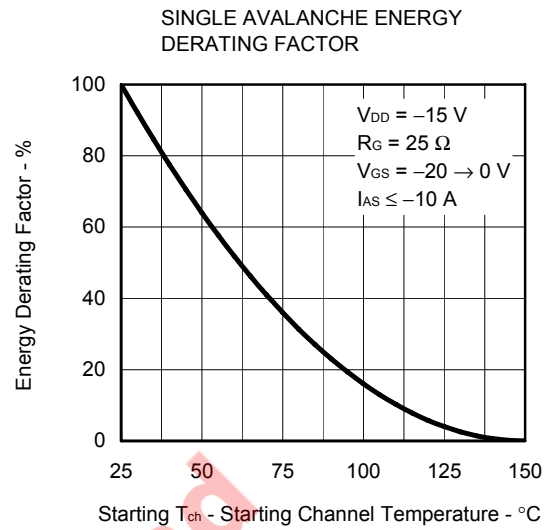
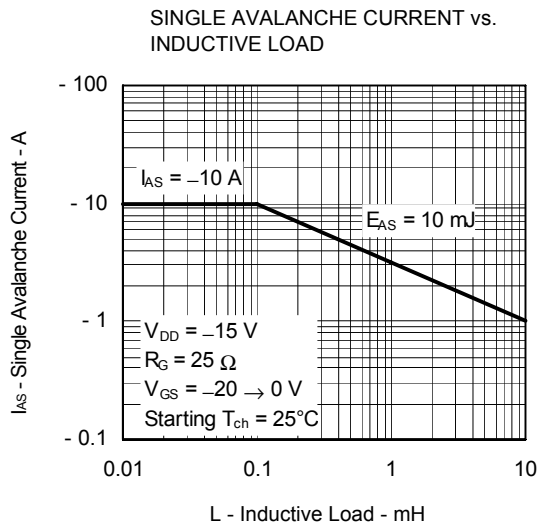


SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT





**ORDERING INFORMATION**

PART NUMBER	LEAD PLATING	PACKING	PACKAGE
μ PA2719AGR-E1-AT <sup>Note</sup>	Pure Sn (Tin)	Tape 2500 p/reel	Power SOP8
μ PA2719AGR-E2-AT <sup>Note</sup>			0.08 g TYP.

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

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