To our customers,

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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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DATA SHEET

RENESAS

# MOS FIELD EFFECT TRANSISTOR
# μPA2718AGR

## SWITCHING
## P-CHANNEL POWER MOS FET

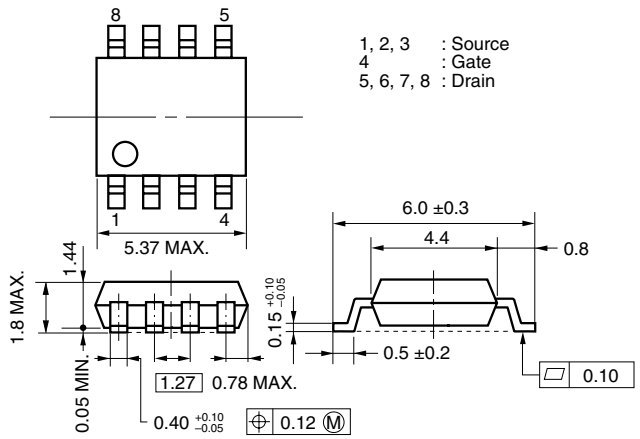
### DESCRIPTION

The μPA2718AGR 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
  $R_{DS(on)1}$ = 9.0 mΩ MAX. ($V_{GS}$ = –10 V, $I_D$ = –6.5 A)
  $R_{DS(on)2}$ = 14.5 mΩ MAX. ($V_{GS}$ = –4.5 V, $I_D$ = –6.5 A)
- Low input capacitance
  $C_{iss}$ = 2810 pF TYP.
- Built-in gate protection diode
- Small and surface mount package (Power SOP8)

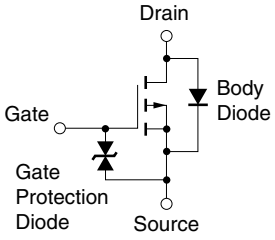
### PACKAGE DRAWING (Unit: mm)




### 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) | $I_{D(DC)}$ | ∓13 | A |
| Drain Current (pulse) Note1 | $I_{D(pulse)}$ | ∓130 | A |
| Total Power Dissipation Note2 | $P_{T1}$ | 2 | W |
| Total Power Dissipation Note3 | $P_{T2}$ | 2 | W |
| Channel Temperature | $T_{ch}$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | –55 to +150 | °C |
| Single Avalanche Current Note4 | $I_{AS}$ | –13 | A |
| Single Avalanche Energy Note4 | $E_{AS}$ | 16.9 | mJ |

### EQUIVALENT CIRCUIT




**Notes 1.** PW ≤ 10 μs, Duty Cycle ≤ 1%
**2.** Mounted on ceramic substrate of 1200 $mm^2$ x 2.2 mm
**3.** Mounted on glass epoxy board of 25.4 mm x 25.4 mm x 0.8 mm, PW = 10 sec
**4.** 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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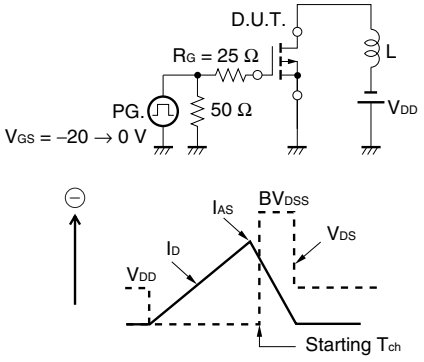
## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C, All terminals are connected.)

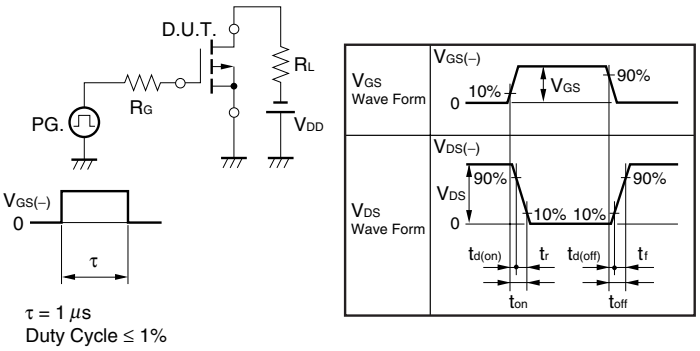
| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = –30 V, $V_{GS}$ = 0 V | | | –1 | μA |
| Gate Leakage Current | $I_{GSS}$ | $V_{GS}$ = ∓20 V, $V_{DS}$ = 0 V | | | ∓10 | μA |
| Gate to Source Cut-off Voltage | $V_{GS(off)}$ | $V_{DS}$ = –10 V, $I_D$ = –1 mA | –1.0 | | –2.5 | V |
| Forward Transfer Admittance Note | $\|y_{fs}\|$ | $V_{DS}$ = –10 V, $I_D$ = –6.5 A | 9 | | | S |
| Drain to Source On-state Resistance Note | $R_{DS(on)1}$ | $V_{GS}$ = –10 V, $I_D$ = –6.5 A | | 7.2 | 9.0 | mΩ |
| | $R_{DS(on)2}$ | $V_{GS}$ = –4.5 V, $I_D$ = –6.5 A | | 9.9 | 14.5 | mΩ |
| | $R_{DS(on)3}$ | $V_{GS}$ = –4.0 V, $I_D$ = –6.5 A | | 11.8 | 18.2 | mΩ |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = –10 V | | 2810 | | pF |
| Output Capacitance | $C_{oss}$ | $V_{GS}$ = 0 V | | 710 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | f = 1 MHz | | 460 | | pF |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$ = –15 V, $I_D$ = –6.5 A | | 13 | | ns |
| Rise Time | $t_r$ | $V_{GS}$ = –10 V | | 18 | | ns |
| Turn-off Delay Time | $t_{d(off)}$ | $R_G$ = 10 Ω | | 510 | | ns |
| Fall Time | $t_f$ | | | 310 | | ns |
| Total Gate Charge | $Q_G$ | $V_{DD}$ = –24 V | | 67 | | nC |
| Gate to Source Charge | $Q_{GS}$ | $V_{GS}$ = –10 V | | 6.5 | | nC |
| Gate to Drain Charge | $Q_{GD}$ | $I_D$ = –13 A | | 19 | | nC |
| Body Diode Forward Voltage Note | $V_{F(S-D)}$ | $I_F$ = 13 A, $V_{GS}$ = 0 V | | 0.84 | | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$ = 13 A, $V_{GS}$ = 0 V | | 180 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | di/dt = 50 A/μs | | 14 | | nC |

**Note** Pulsed

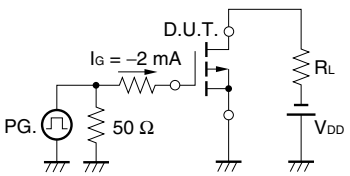
### TEST CIRCUIT 1 AVALANCHE CAPABILITY




### TEST CIRCUIT 2 SWITCHING TIME

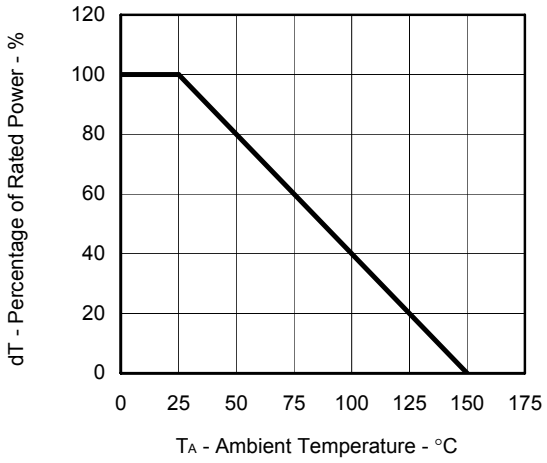



### TEST CIRCUIT 3 GATE CHARGE

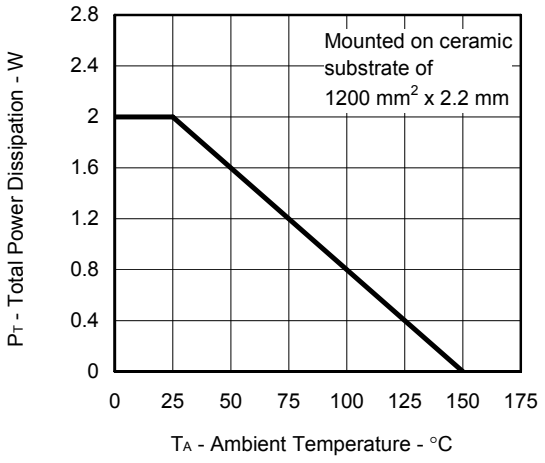


## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C)

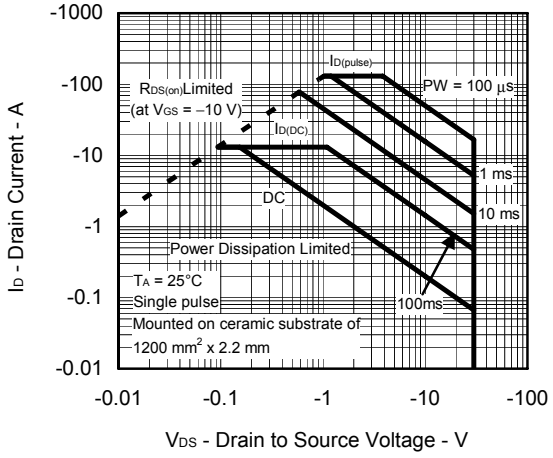
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



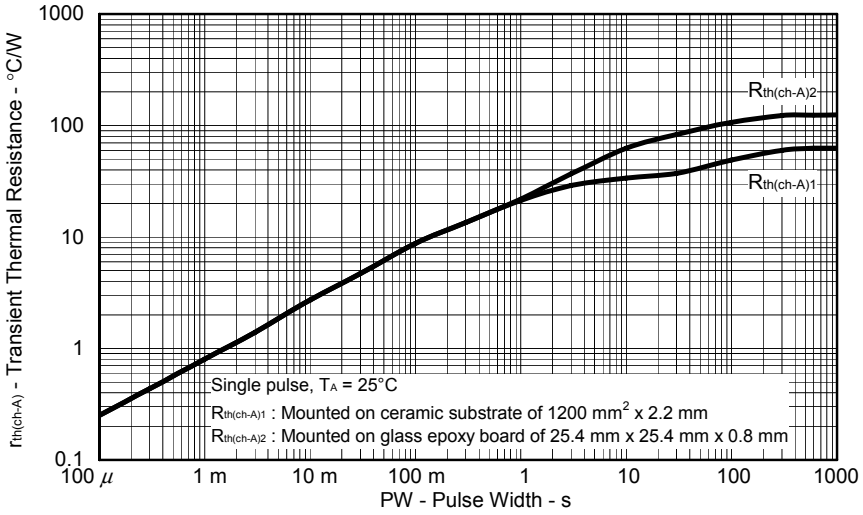

TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



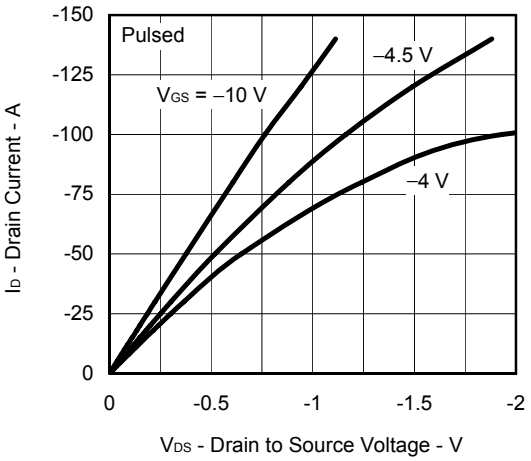

FORWARD BIAS SAFE OPERATING AREA



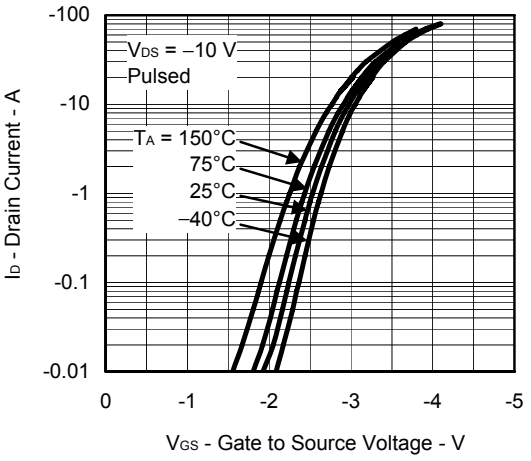

TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



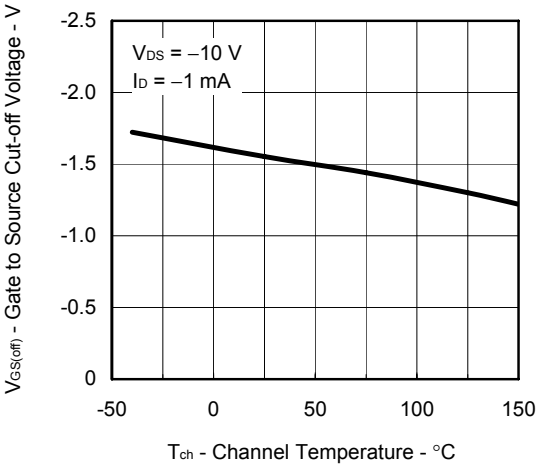
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



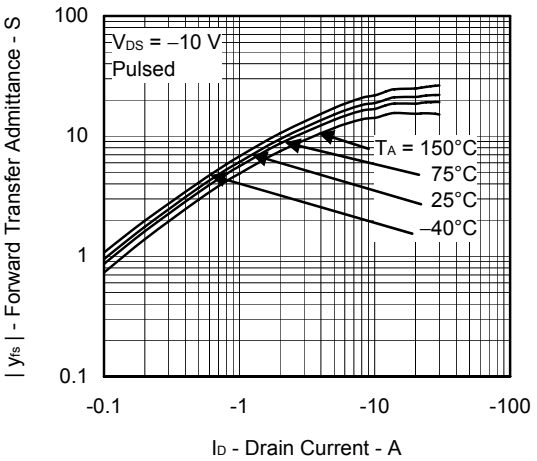

FORWARD TRANSFER CHARACTERISTICS



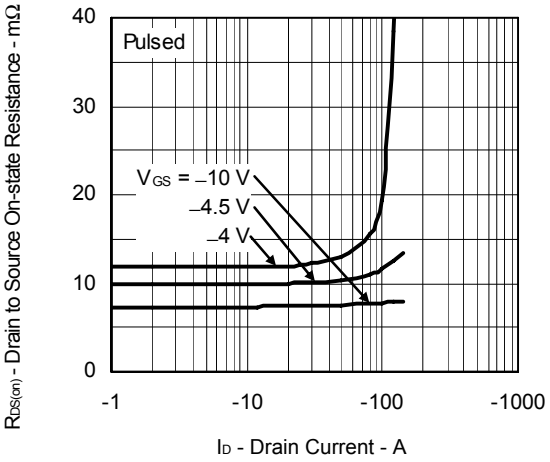

GATE TO SOURCE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



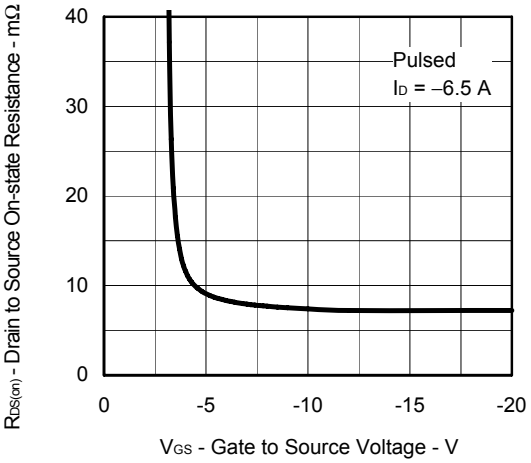

FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



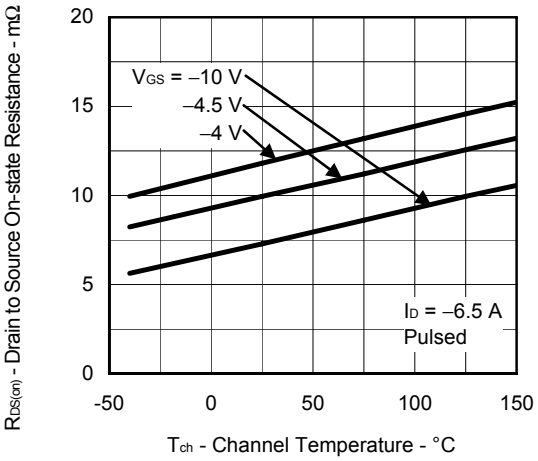

DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



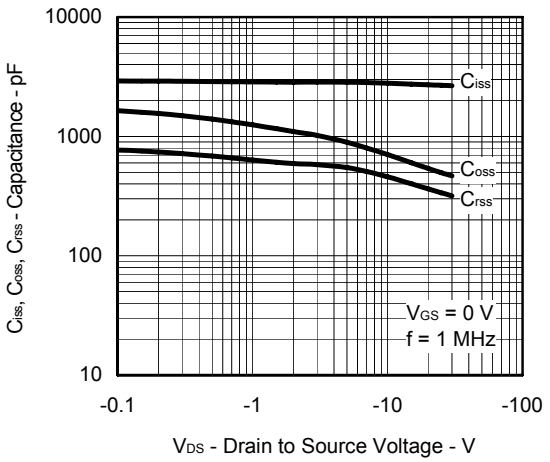

DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



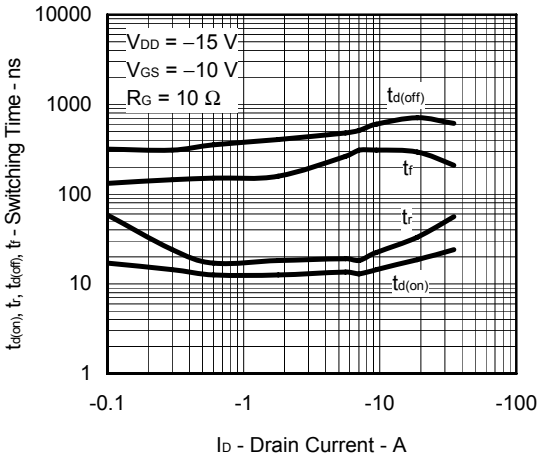
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



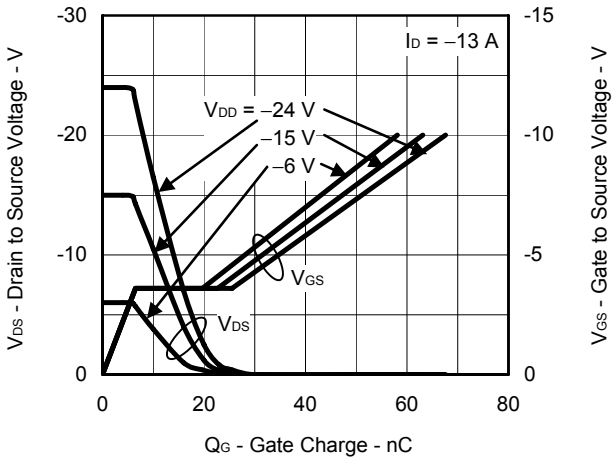

CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



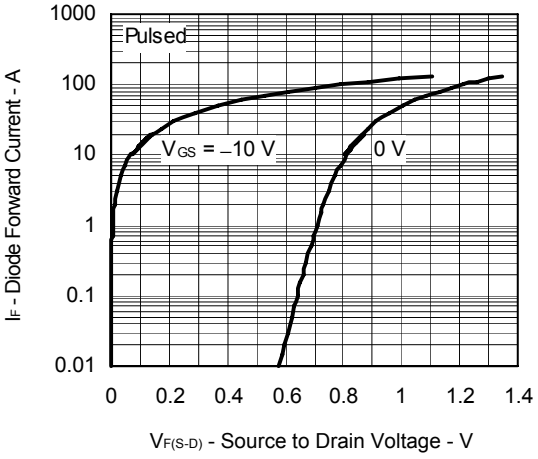

SWITCHING CHARACTERISTICS



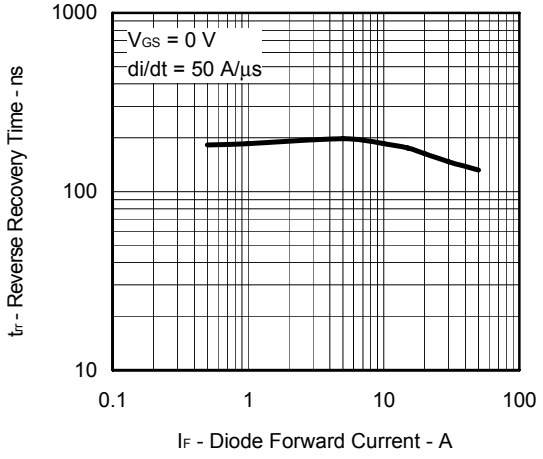

DYNAMIC INPUT/OUTPUT CHARACTERISTICS



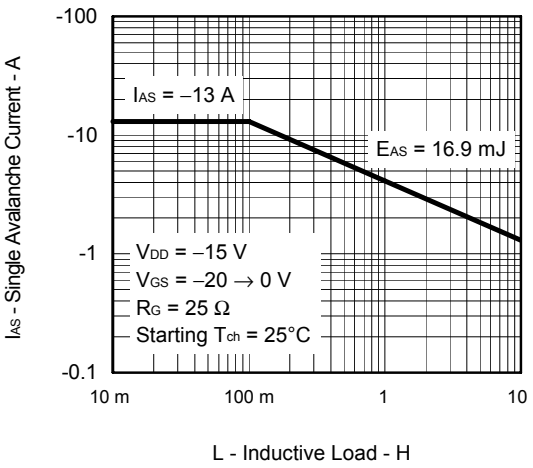

SOURCE TO DRAIN DIODE FORWARD VOLTAGE



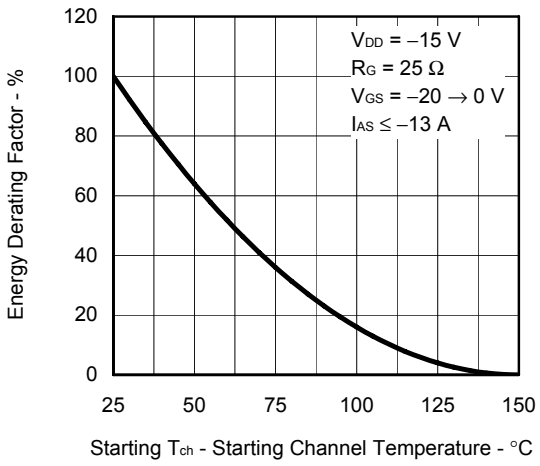

REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD




SINGLE AVALANCHE ENERGY
DERATING FACTOR




## ORDERING INFORMATION

| PART NUMBER | LEAD PLATING | PACKING | PACKAGE |
|---|---|---|---|
| μPA2718AGR-E1-AT **Note** | Pure Sn (Tin) | Tape 2500 p/reel | Power SOP8<br>0.08 g TYP. |
| μPA2718AGR-E2-AT **Note** | | | |

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

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