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April 1st, 2010
Renesas Electronics Corporation

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

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MOS FIELD EFFECT TRANSISTOR

μPA1728

SWITCHING

N-CHANNEL POWER MOS FET

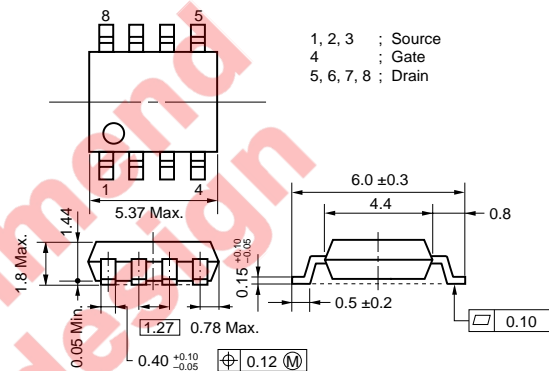
DESCRIPTION

The μPA1728 is N-Channel MOS Field Effect Transistor designed for high current switching applications.

FEATURES

- Single chip type
- Low on-state resistance
 $R_{DS(on)1} = 19 \text{ m}\Omega$ TYP. ($V_{GS} = 10 \text{ V}$, $I_D = 4.5 \text{ A}$)
 $R_{DS(on)2} = 23 \text{ m}\Omega$ TYP. ($V_{GS} = 4.5 \text{ V}$, $I_D = 4.5 \text{ A}$)
 $R_{DS(on)3} = 24 \text{ m}\Omega$ TYP. ($V_{GS} = 4.0 \text{ V}$, $I_D = 4.5 \text{ A}$)
- Low C_{iss} : $C_{iss} = 1700 \text{ pF}$ TYP.
- Built-in G-S protection diode
- Small and surface mount package (Power SOP8)

PACKAGE DRAWING (Unit: mm)



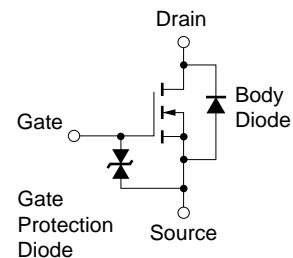
★ ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1728G	Power SOP8

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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	60	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	±20	V
Drain Current (DC)	$I_{D(DC)}$	±9	A
Drain Current (Pulse) ^{Note1}	$I_{D(pulse)}$	±36	A
Total Power Dissipation ($T_A = 25^\circ\text{C}$) ^{Note2}	P_T	2.0	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	-55 to + 150	°C
Single Avalanche Current ^{Note3}	I_{AS}	9	A
Single Avalanche Energy ^{Note3}	E_{AS}	81	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. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 30 \text{ V}$, $R_G = 25 \Omega$, $T_{GS} = 20 \rightarrow 0 \text{ V}$

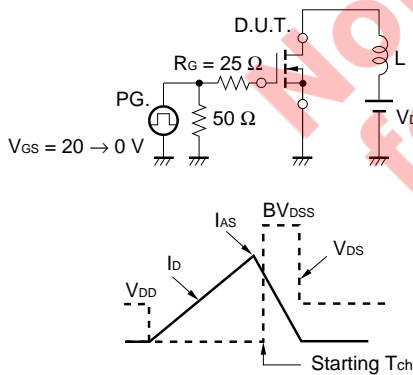
Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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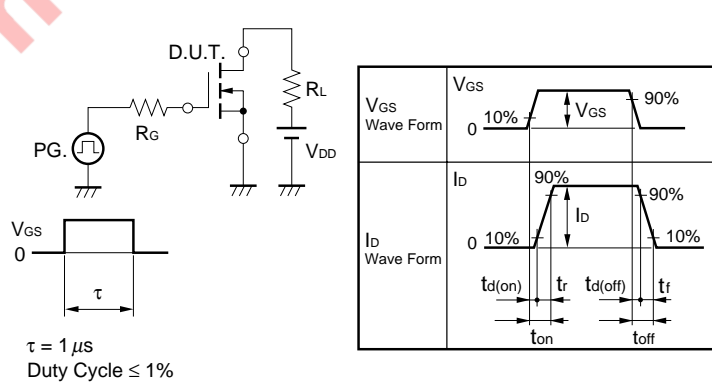
ELECTRICAL CHARACTERISTICS (T_A = 25°C, All terminals are connected.)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V			10	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	1.5	2.0	2.5	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 4.5 A	6.0	12		S
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 10 V, I _D = 4.5 A		19	26	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 4.5 A		23	29	mΩ
	R _{DS(on)3}	V _{GS} = 4.0 V, I _D = 4.5 A		24	34	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		1700		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		270		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		130		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 30 V, I _D = 4.5 A		17		ns
Rise Time	t _r	V _{GS} = 10 V		69		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		77		ns
Fall Time	t _f			31		ns
Total Gate Charge	Q _G	V _{DD} = 48 V		31		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		4.4		nC
Gate to Drain Charge	Q _{GD}	I _D = 9 A		9.1		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 9 A, V _{GS} = 0 V		0.82		V
Reverse Recovery Time	t _{rr}	I _F = 9 A, V _{GS} = 0 V		41		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		76		nC

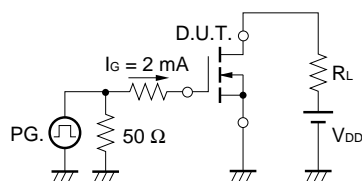
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

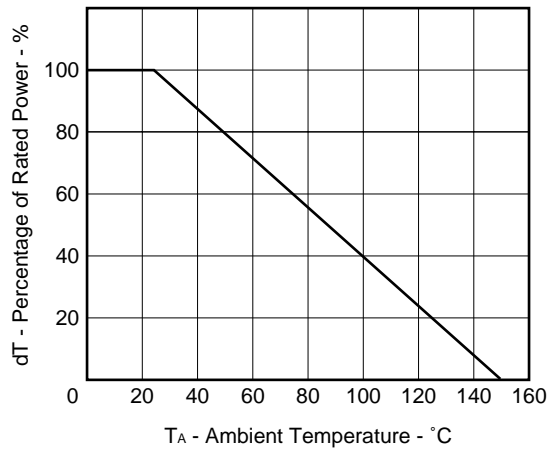


TEST CIRCUIT 3 GATE CHARGE

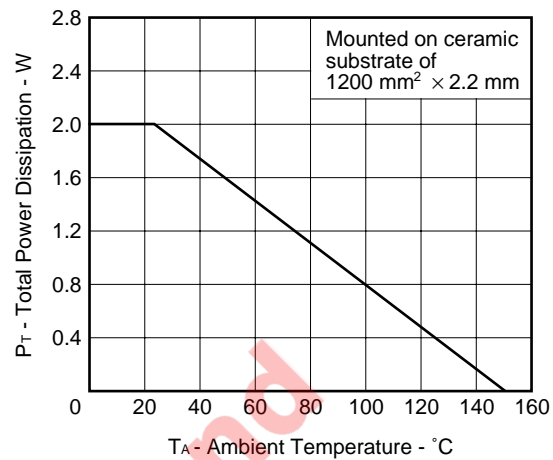


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

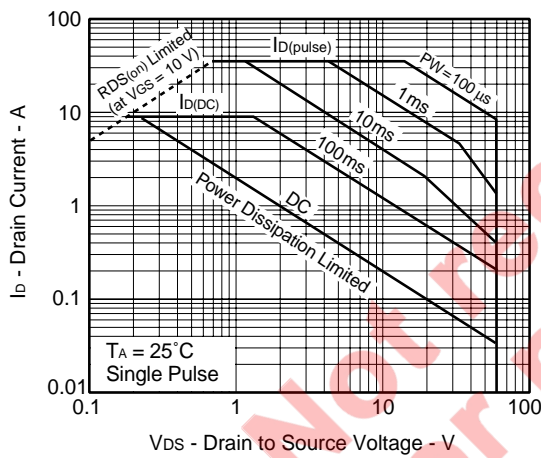
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



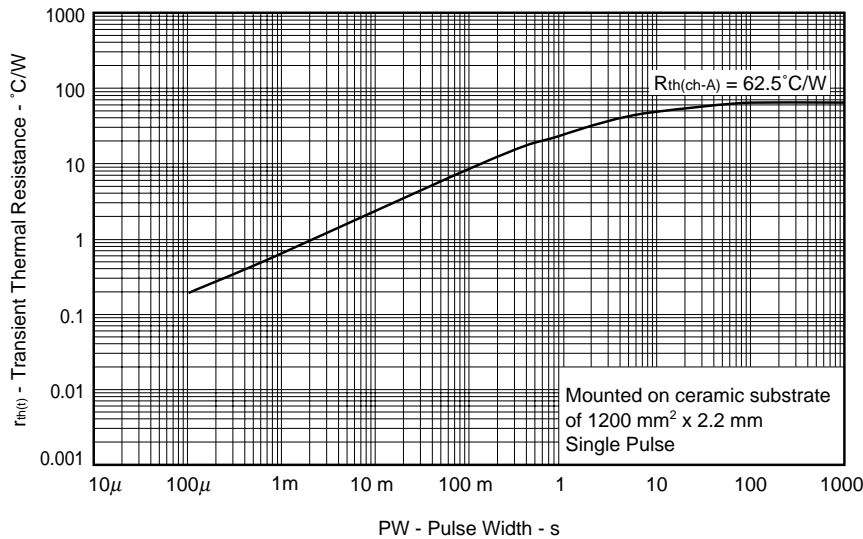
FORWARD BIAS SAFE OPERATING AREA



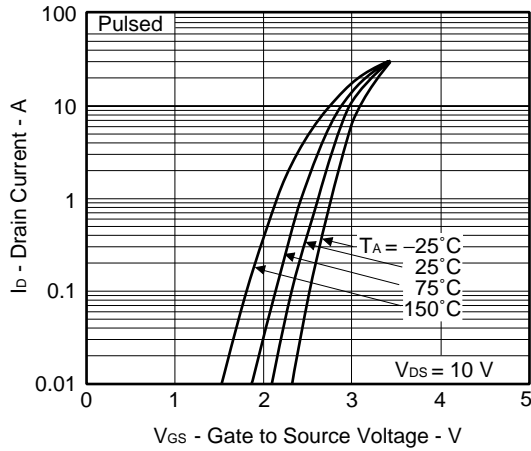
Remark

Mounted on ceramic substrate of 1200 mm² x 2.2 mm

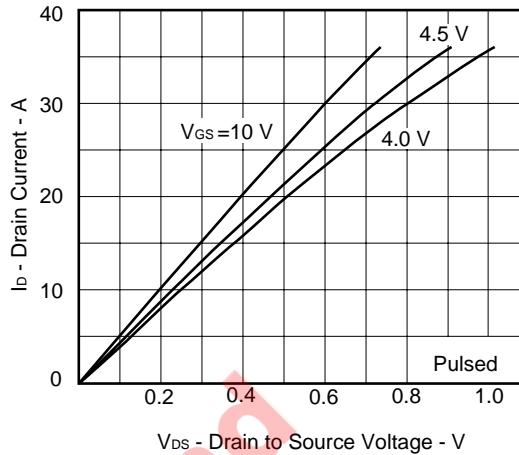
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



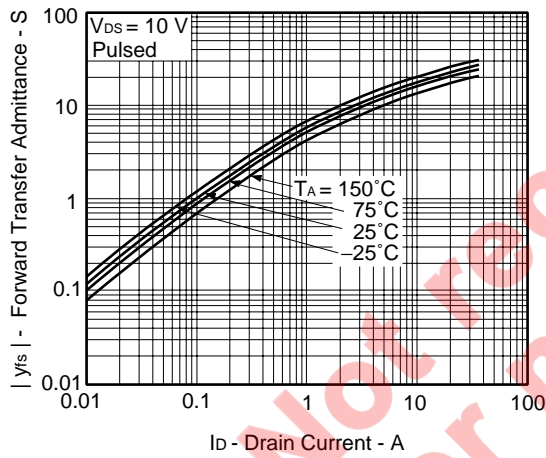
FORWARD TRANSFER CHARACTERISTICS



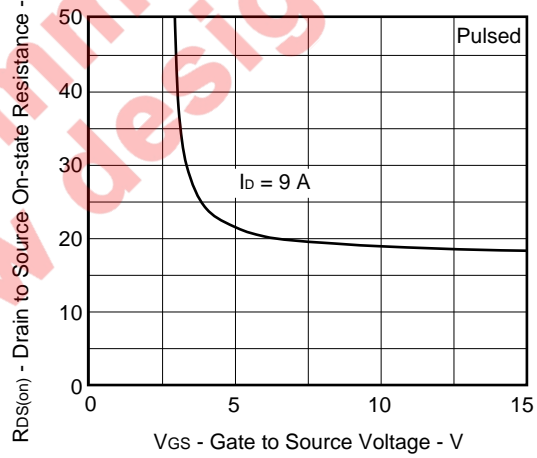
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



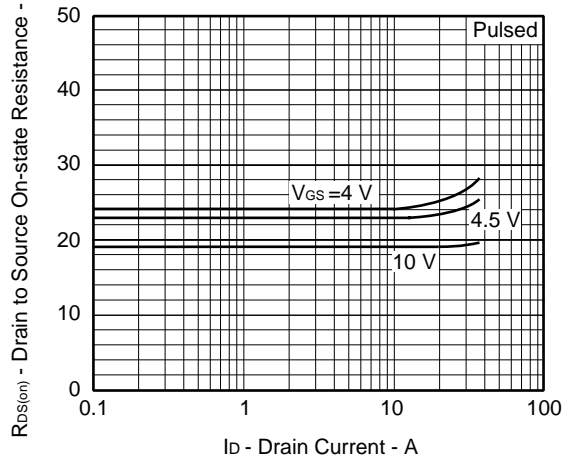
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



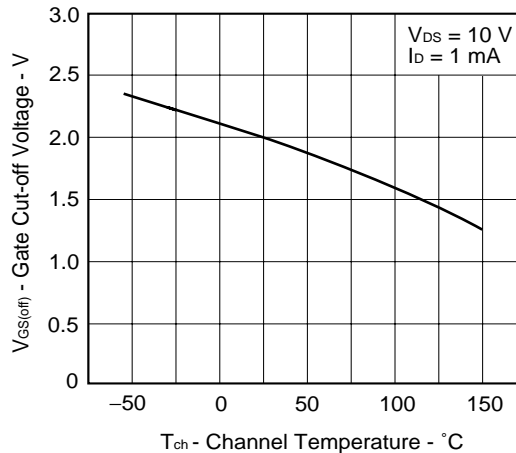
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



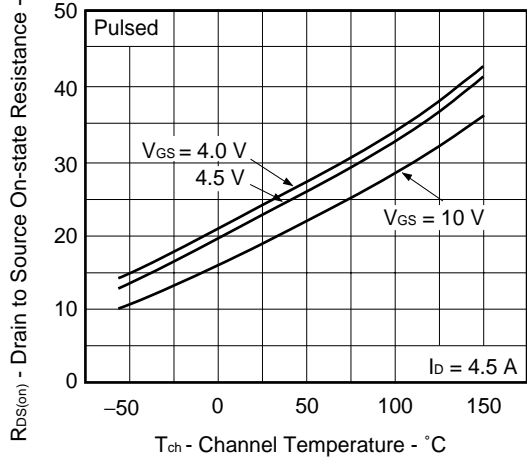
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



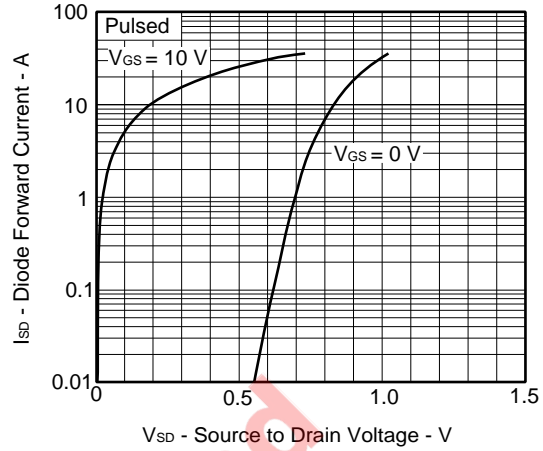
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



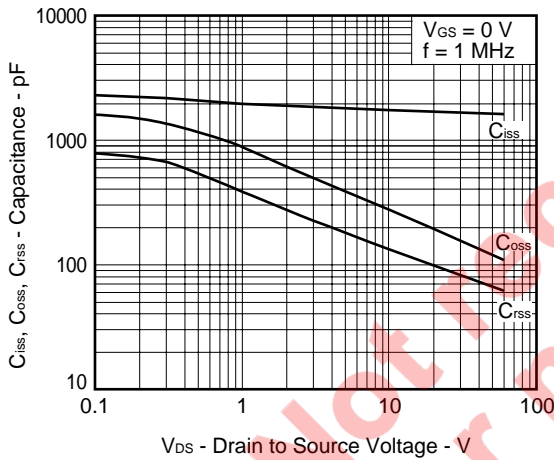
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



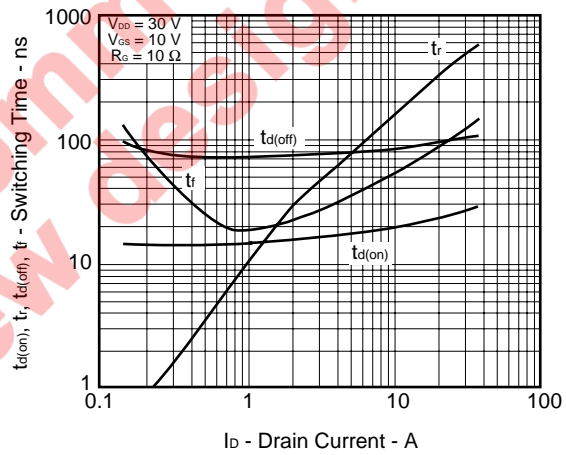
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



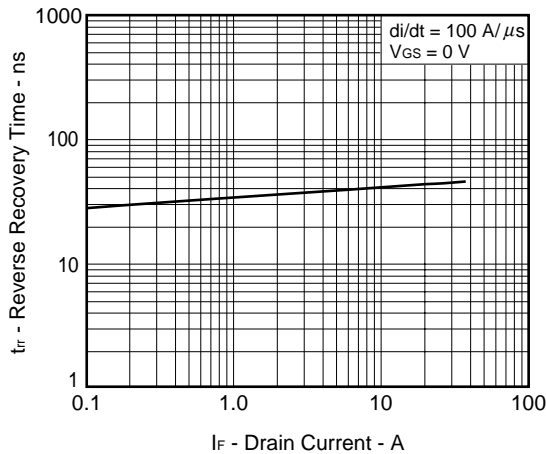
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



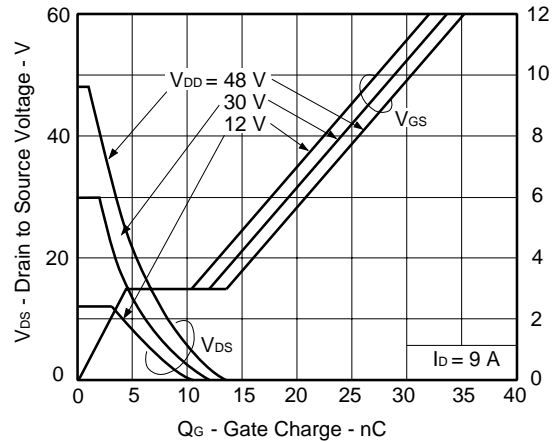
SWITCHING CHARACTERISTICS

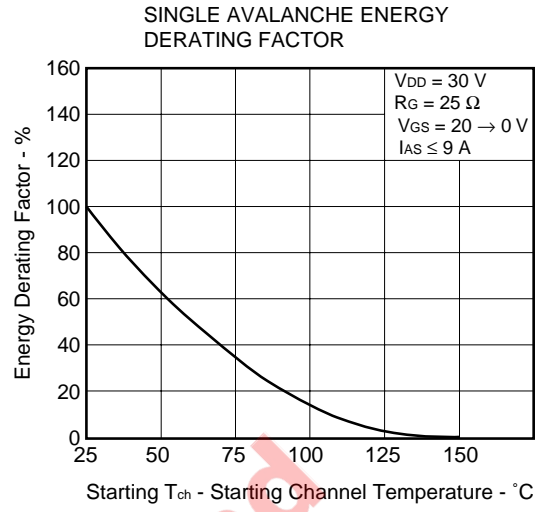
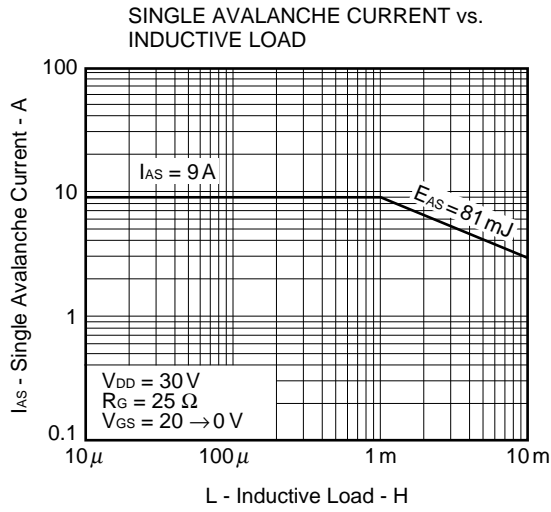


REVERSE RECOVERY TIME vs. DRAIN CURRENT



DYNAMIC INPUT/OUTPUT CHARACTERISTICS





Not recommended for new design

[MEMO]

**Not recommend
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