

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

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

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N-CHANNEL MOS FIELD EFFECT TRANSISTOR
FOR SWITCHING

DESCRIPTION

The μ PA1857 features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as power switch of portable machine and so on.

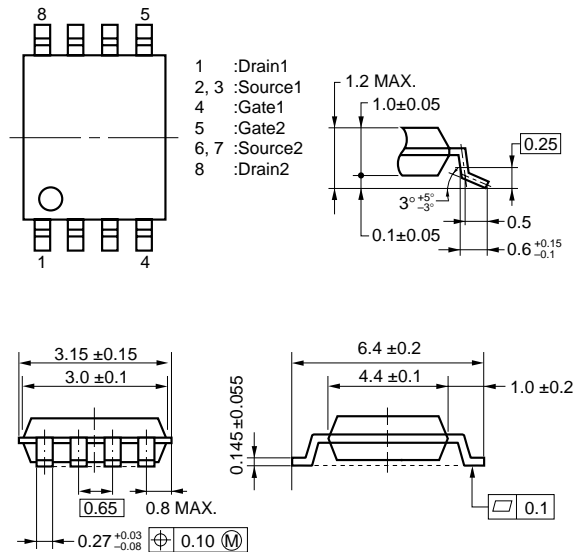
FEATURES

- Low on-state resistance
 $R_{DS(on)1} = 67.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 2.0 \text{ A)}$
 $R_{DS(on)2} = 86.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 2.0 \text{ A)}$
 $R_{DS(on)3} = 95.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 2.0 \text{ A)}$
- Low C_{iss} $C_{iss} = 580 \text{ pF TYP.}$
- Built-in G-S protection diode against ESD

ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA1857GR-9JG	Power TSSOP8

PACKAGE DRAWING (Unit: mm)



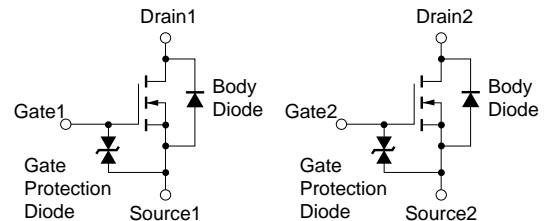
ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

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) ($T_A = 25^\circ\text{C}$)	$I_{D(DC)}$	± 3.8	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 15.2	A
Total Power Dissipation (1unit) ^{Note2}	P_{T1}	1.0	W
Total Power Dissipation (2unit) ^{Note2}	P_{T2}	1.7	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	$-55 \text{ to } +150$	$^\circ\text{C}$
Single Avalanche Current ^{Note3}	I_{AS}	3.8	A
Single Avalanche Energy ^{Note3}	E_{AS}	33	mJ

- Notes**
1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$
 2. $T_A = 25^\circ\text{C}$ Mounted on ceramic substrate of $50 \text{ cm}^2 \times 1.1 \text{ mm}$
 3. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 30 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

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.

EQUIVALENT CIRCUIT

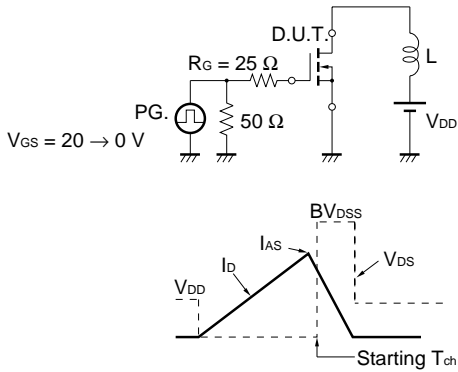


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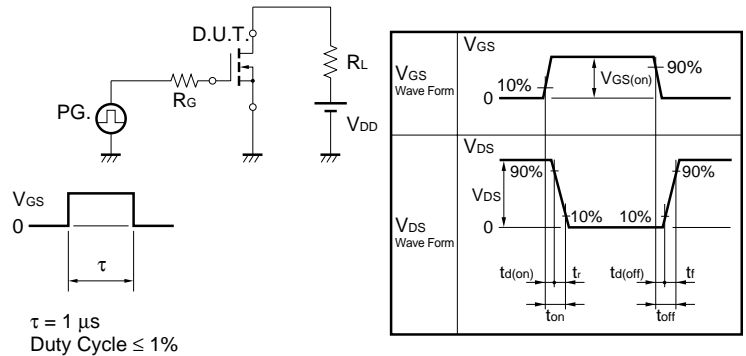
ELECTRICAL CHARACTERISTICS (TA = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			10	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			± 10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.5	2.0	2.5	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 2.0\text{ A}$	2.5	5.4		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	$V_{GS} = 10\text{ V}, I_D = 2.0\text{ A}$		53	67.0	$\text{m}\Omega$
	$R_{DS(on)2}$	$V_{GS} = 4.5\text{ V}, I_D = 2.0\text{ A}$		64	86.0	$\text{m}\Omega$
	$R_{DS(on)3}$	$V_{GS} = 4.0\text{ V}, I_D = 2.0\text{ A}$		71	95.0	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}$		580		pF
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$		100		pF
Reverse Transfer Capacitance	C_{rss}	$f = 1\text{ MHz}$		50		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}, I_D = 2.0\text{ A}$		10		ns
Rise Time	t_r	$V_{GS} = 10\text{ V}$		9		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 6\ \Omega$		32		ns
Fall Time	t_f			4		ns
Total Gate Charge	Q_G	$V_{DD} = 48\text{ V}$		12		nC
Gate to Source Charge	Q_{GS}	$V_{GS} = 10\text{ V}$		2		nC
Gate to Drain Charge	Q_{GD}	$I_D = 3.8\text{ A}$		3		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 3.8\text{ A}, V_{GS} = 0\text{ V}$		0.80		V
Reverse Recovery Time	t_{rr}	$I_F = 3.8\text{ A}, V_{GS} = 0\text{ V}$		33		ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 100\text{ A}/\mu\text{s}$		58		nC

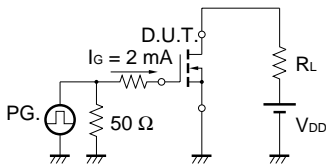
TEST CIRCUIT 1 AVALANCHE CAPABILITY



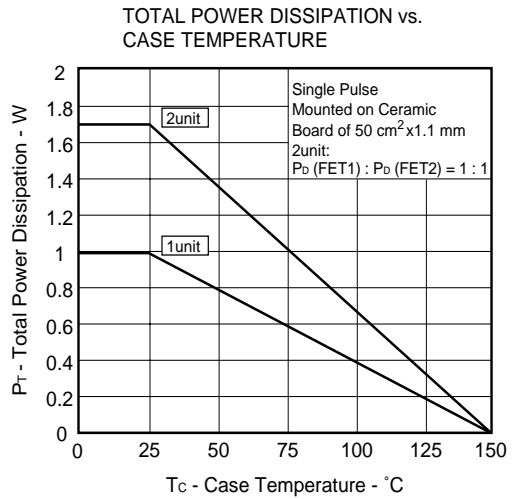
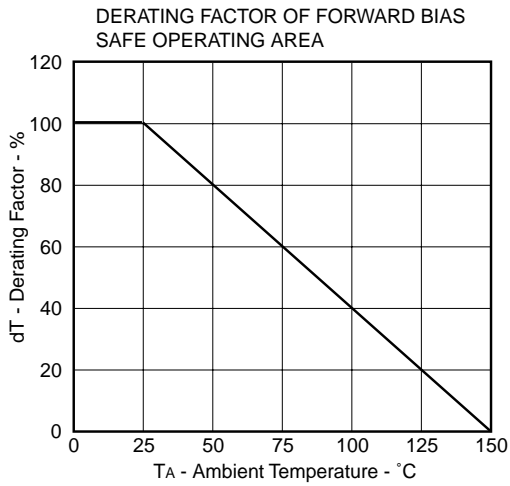
TEST CIRCUIT 2 SWITCHING TIME



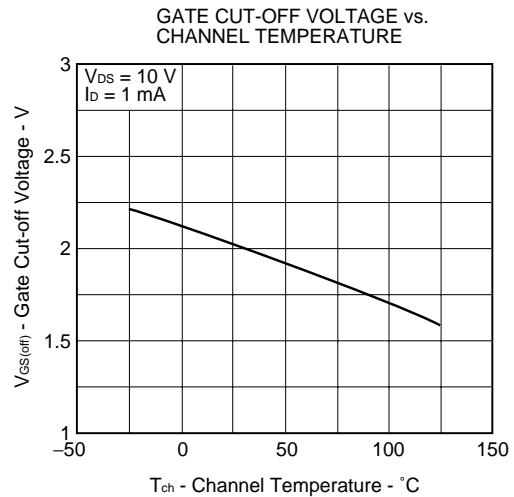
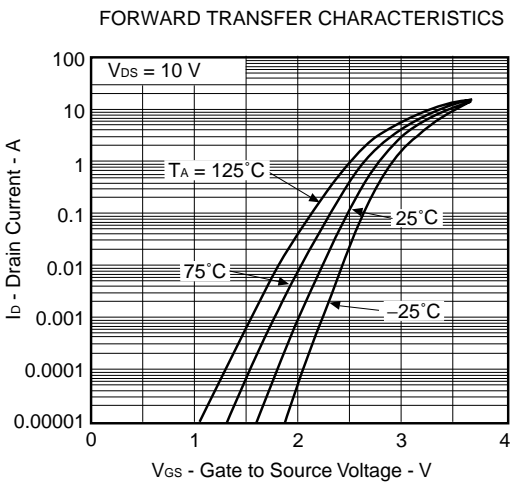
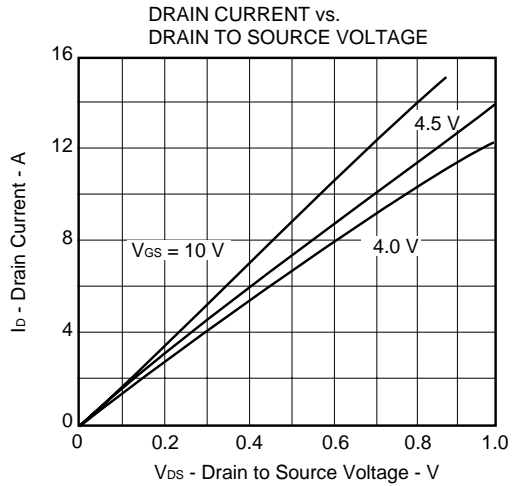
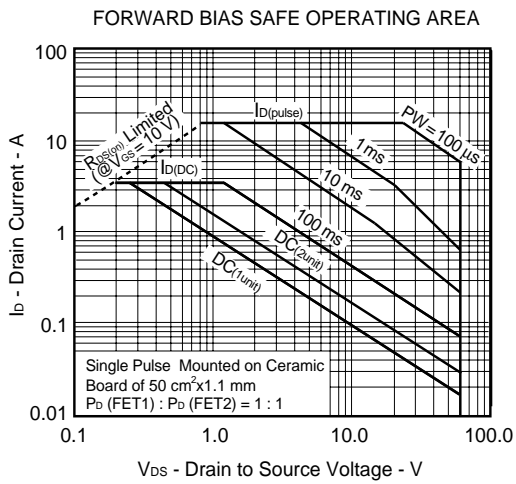
TEST CIRCUIT 3 GATE CHARGE

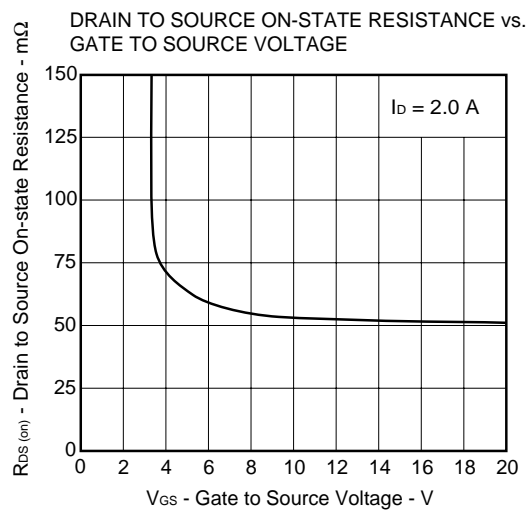
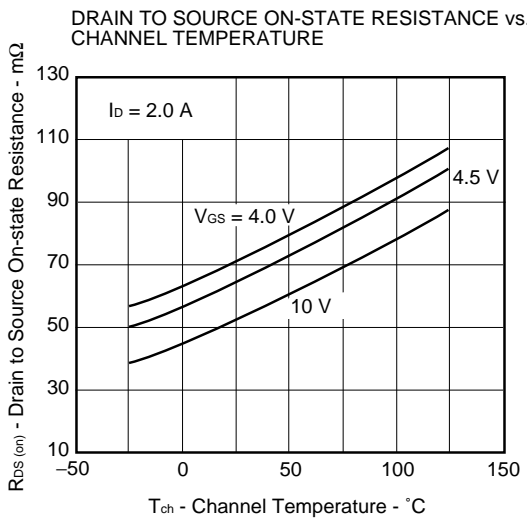
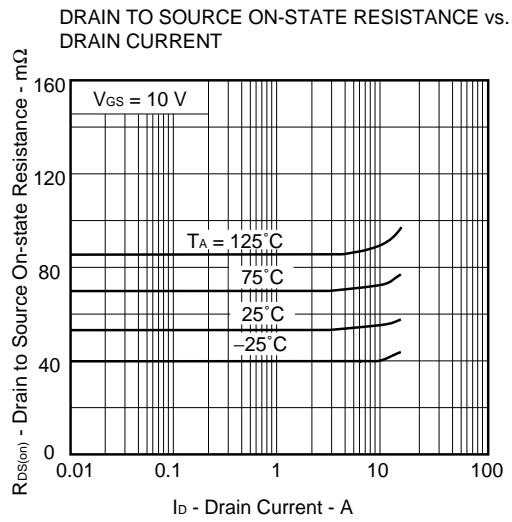
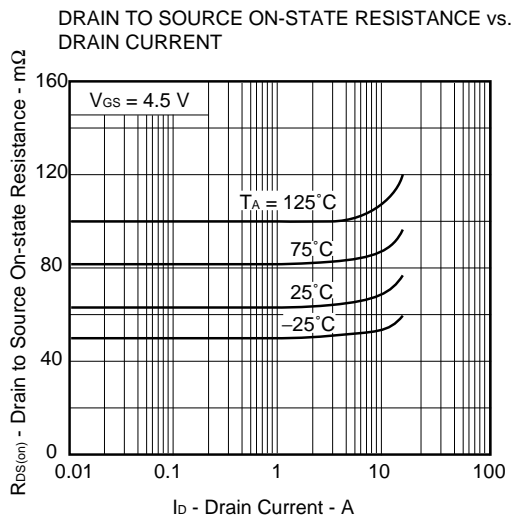
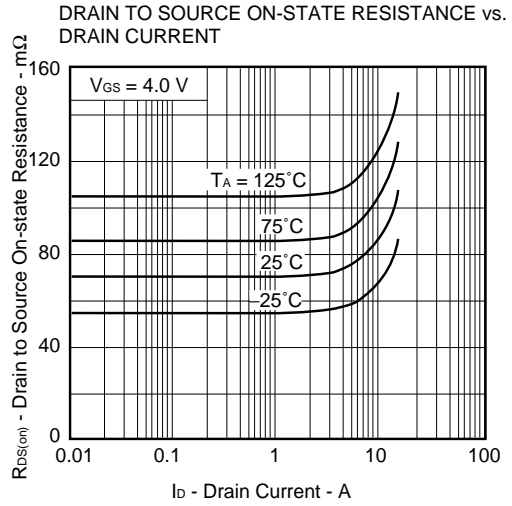
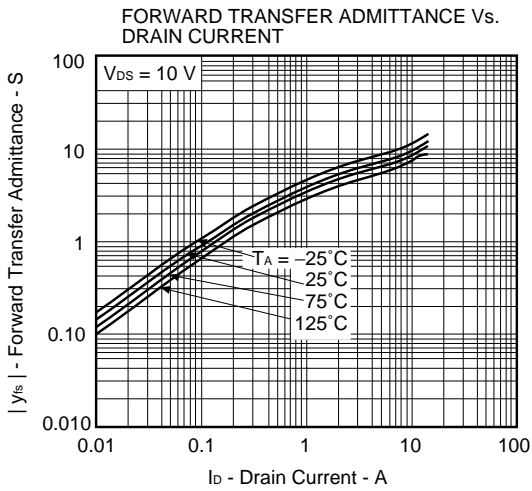


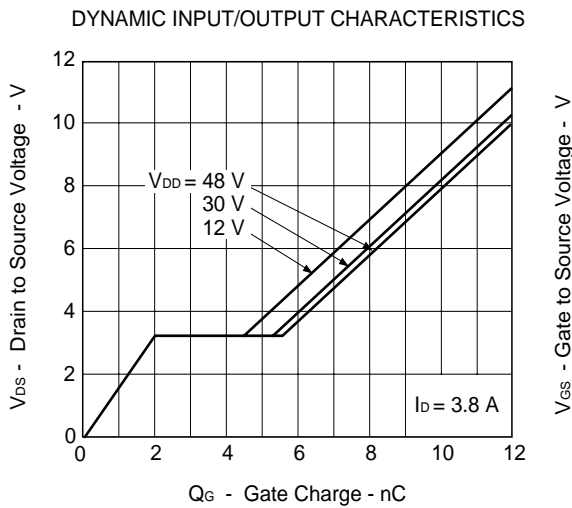
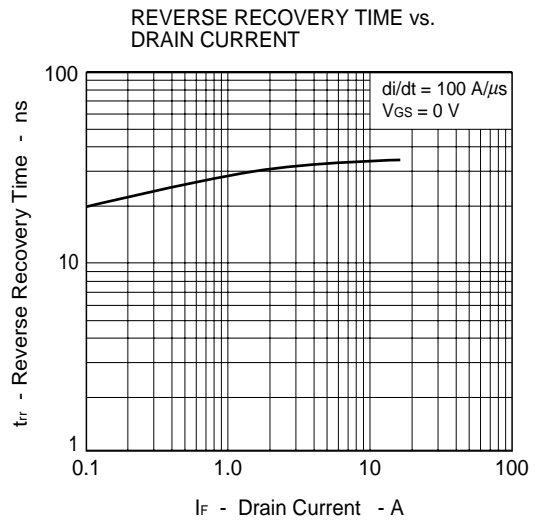
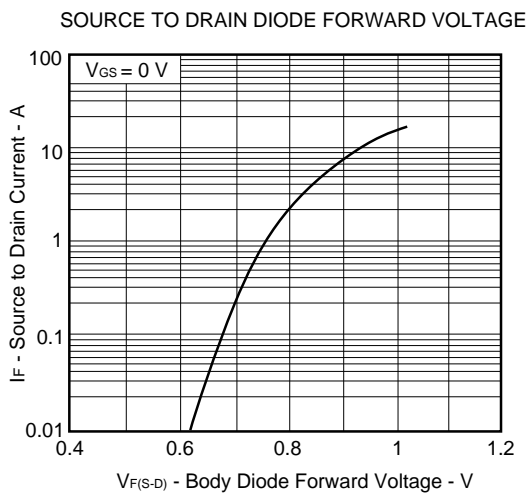
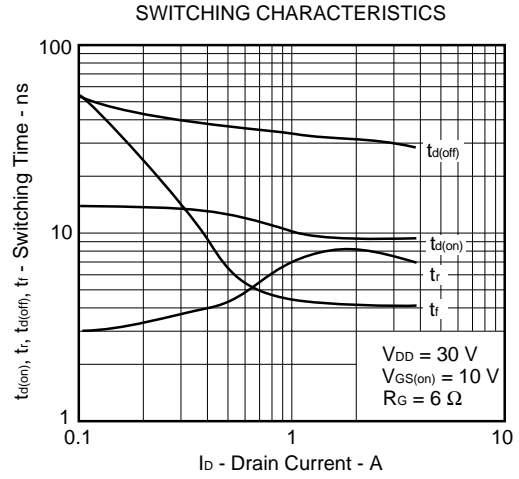
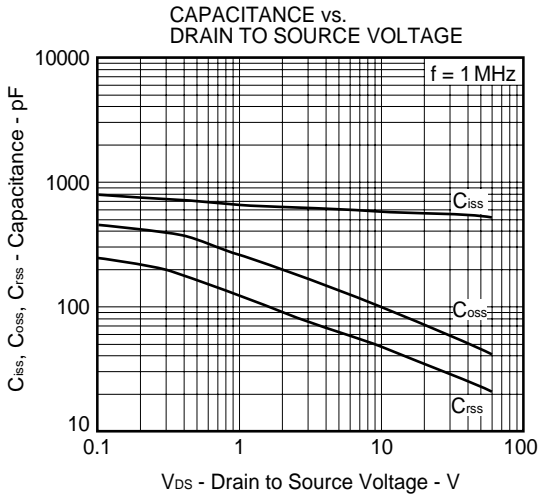
TYPICAL CHARACTERISTICS (T_A = 25°C)

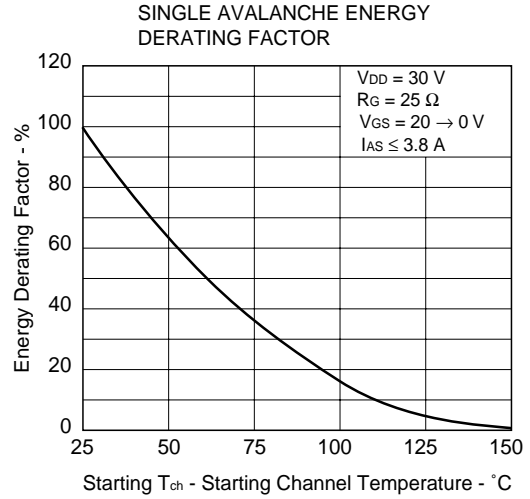
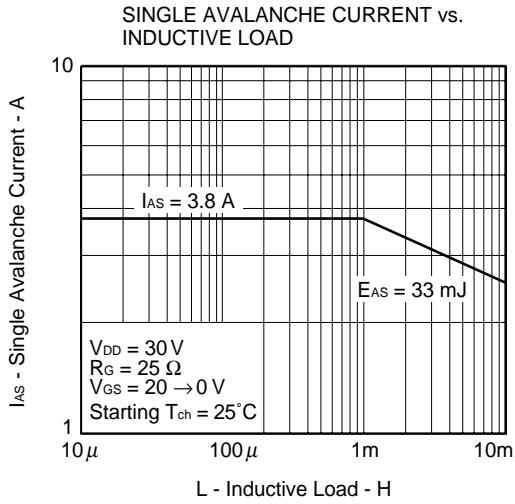


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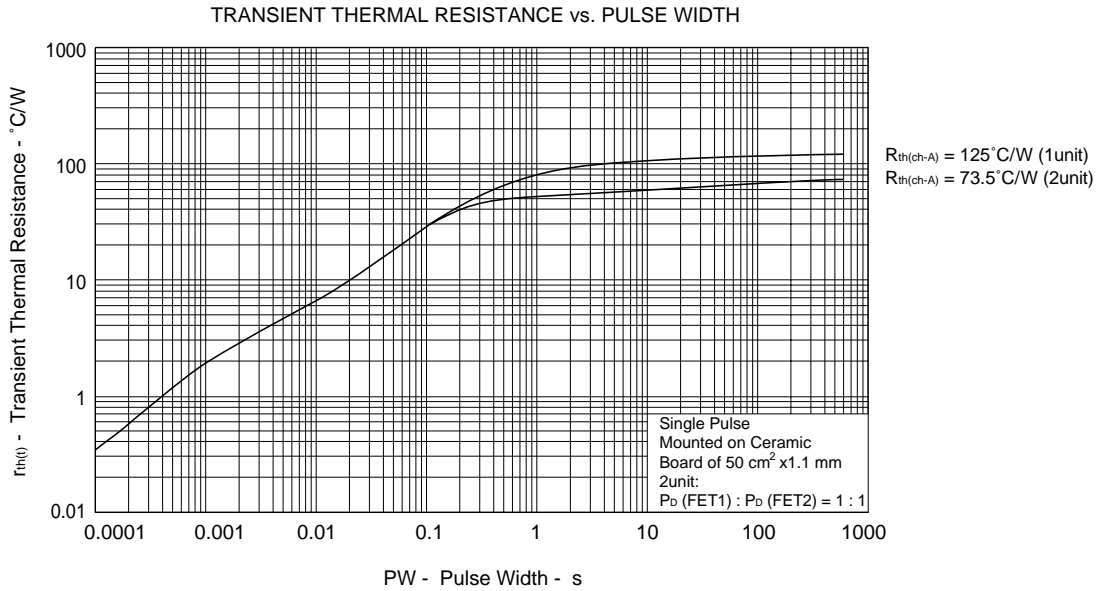








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