

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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MOS FIELD EFFECT TRANSISTOR
μPA2803SWITCHING
N-CHANNEL POWER MOSFET

DESCRIPTION

The μPA2803 is N-channel MOSFET designed for DC/DC converter and power management applications of portable equipments.

FEATURES

- Low on-state resistance
 $R_{DS(on)1} = 5.8 \text{ m}\Omega \text{ MAX. } (V_{GS} = 4.5 \text{ V}, I_D = 20 \text{ A})$
 $R_{DS(on)2} = 9.5 \text{ m}\Omega \text{ MAX. } (V_{GS} = 2.5 \text{ V}, I_D = 10 \text{ A})$
- Built-in gate protection diode
- Thin type surface mount package with heat spreader
- RoHS Compliant

ABSOLUTE MAXIMUM RATINGS (TA = 25°C, All terminals are connected.)

Drain to Source Voltage (VGS = 0 V)	V _{DSS}	20	V
Gate to Source Voltage (VDS = 0 V)	V _{GSS}	±12	V
Drain Current (DC)	I _{D(DC)}	±20	A
Drain Current (pulse) ^{Note1}	I _{D(pulse)}	±80	A
Total Power Dissipation ^{Note2}	P _{T1}	1.5	W
Total Power Dissipation (PW = 10 sec) ^{Note2}	P _{T2}	3.8	W
Channel Temperature	T _{ch}	150	°C
Storage Temperature	T _{stg}	−55 to +150	°C
Single Avalanche Current ^{Note3}	I _{AS}	20	A
Single Avalanche Energy ^{Note3}	E _{AS}	40	mJ

THERMAL RESISTANCE

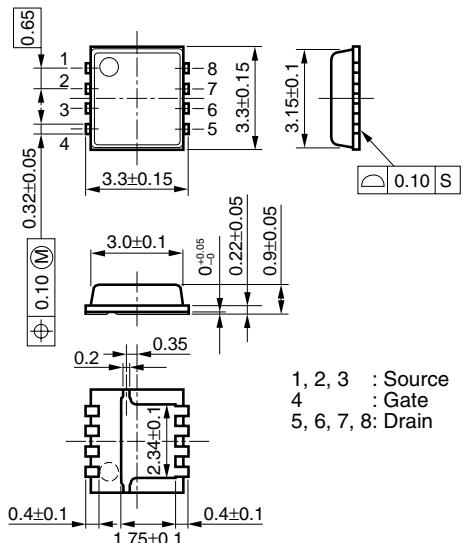
Channel to Ambient Thermal Resistance ^{Note2}	R _{th(ch-A)}	83.3	°C/W
Channel to Case (Drain) Thermal Resistance	R _{th(ch-C)}	2.4	°C/W

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%
2. Mounted on FR-4 board of 25.4 mm × 25.4 mm × 0.8 mm
3. Starting T_{ch} = 25°C, V_{DD} = 10 V, R_G = 25 Ω, V_{GS} = 12 → 0 V, L = 100 μH

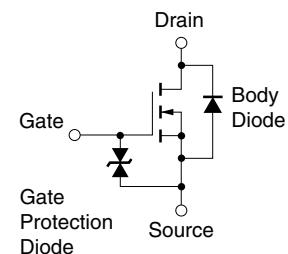
Remark The diode connected between the gate and source of the transistor serves as a protector against ESD.

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

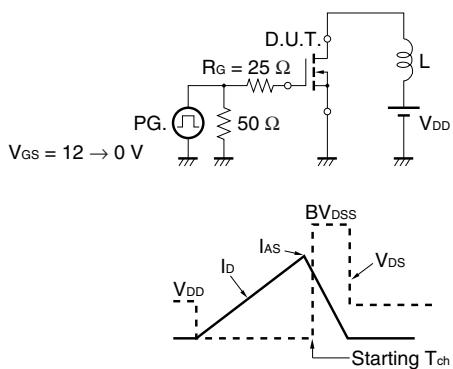


ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, All terminals are connected.)

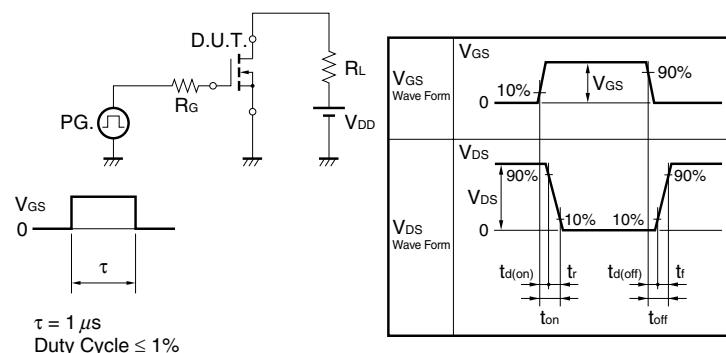
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$			10	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 12\text{ V}$, $V_{DS} = 0\text{ V}$			± 10	μA
Gate to Source Cut-off Voltage	$V_{GS(\text{off})}$	$V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$	0.5		1.5	V
Forward Transfer Admittance ^{Note}	$ y_{fs} $	$V_{DS} = 10\text{ V}$, $I_D = 10\text{ A}$	10			S
Drain to Source On-state Resistance ^{Note}	$R_{DS(\text{on})1}$	$V_{GS} = 4.5\text{ V}$, $I_D = 20\text{ A}$		4.7	5.8	$\text{m}\Omega$
	$R_{DS(\text{on})2}$	$V_{GS} = 2.5\text{ V}$, $I_D = 10\text{ A}$		7.1	9.5	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		2450		pF
Output Capacitance	C_{oss}			390		pF
Reverse Transfer Capacitance	C_{rss}			245		pF
Turn-on Delay Time	$t_{d(\text{on})}$	$V_{DD} = 10\text{ V}$, $I_D = 10\text{ A}$, $V_{GS} = 4\text{ V}$, $R_G = 10\Omega$		20		ns
Rise Time	t_r			60		ns
Turn-off Delay Time	$t_{d(\text{off})}$			58		ns
Fall Time	t_f			26		ns
Total Gate Charge	Q_G	$V_{DD} = 10\text{ V}$, $V_{GS} = 4\text{ V}$, $I_D = 20\text{ A}$		20		nC
Gate to Source Charge	Q_{GS}			5		nC
Gate to Drain Charge	Q_{GD}			7		nC
Body Diode Forward Voltage ^{Note}	$V_{F(S-D)}$	$I_F = 20\text{ A}$, $V_{GS} = 0\text{ V}$		0.82	1.2	V
Reverse Recovery Time	t_{rr}	$I_F = 20\text{ A}$, $V_{GS} = 0\text{ V}$, $di/dt = 100\text{ A}/\mu\text{s}$		31		ns
Reverse Recovery Charge	Q_{rr}			25		nC
Gate Resistance	R_G	$f = 1\text{ MHz}$		1.4		Ω

Note Pulsed

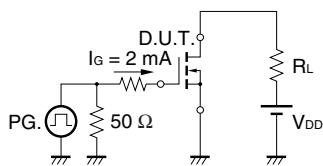
TEST CIRCUIT 1 AVALANCHE CAPABILITY

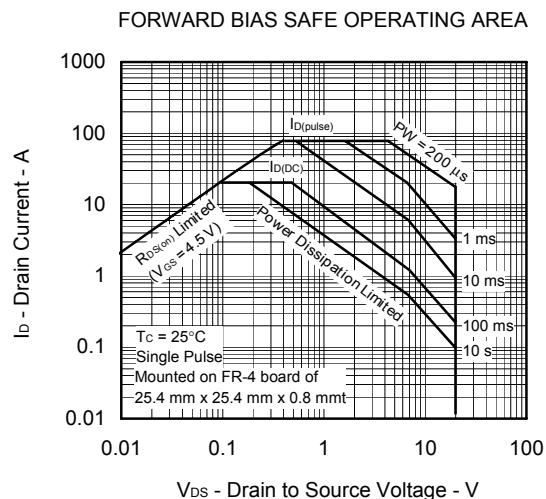
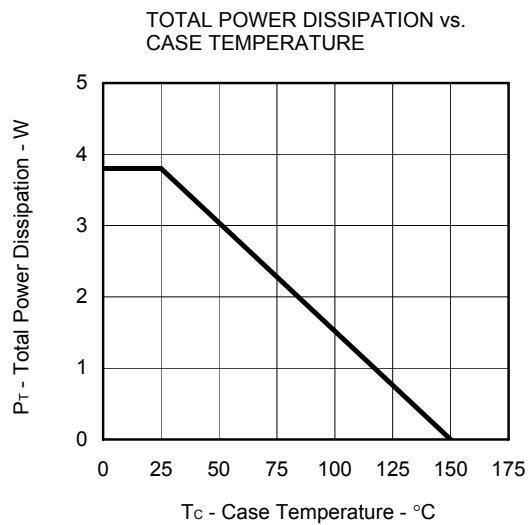
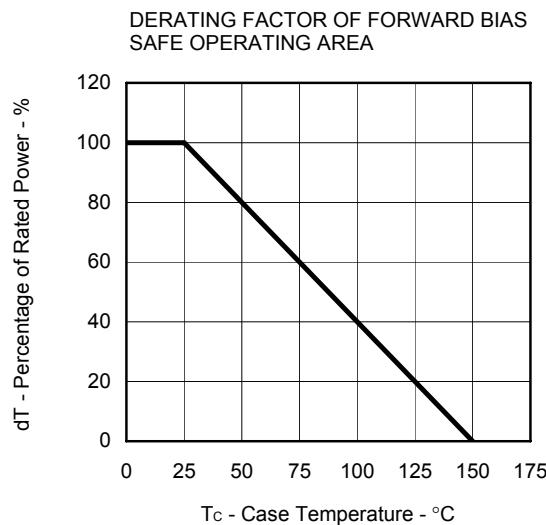
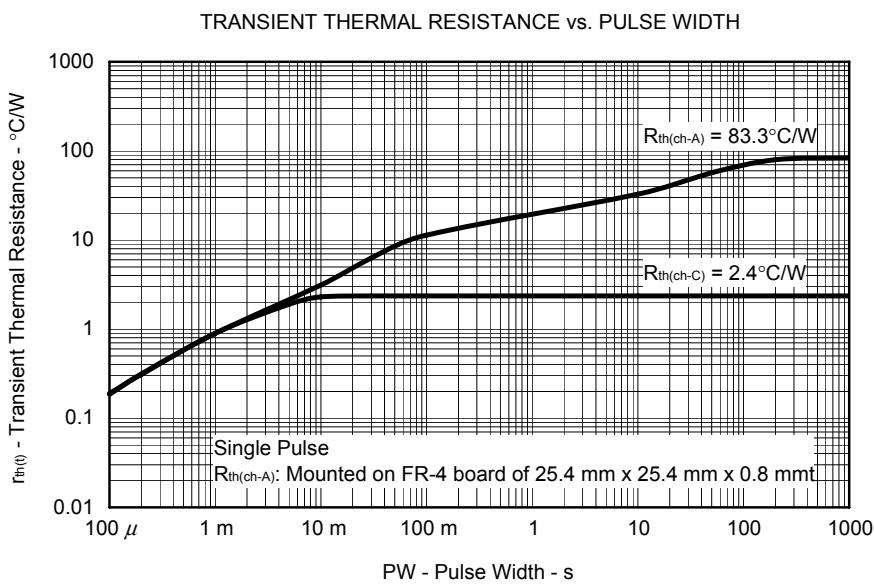


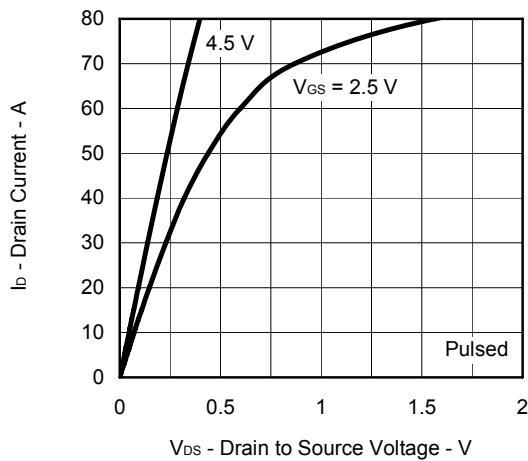
TEST CIRCUIT 2 SWITCHING TIME



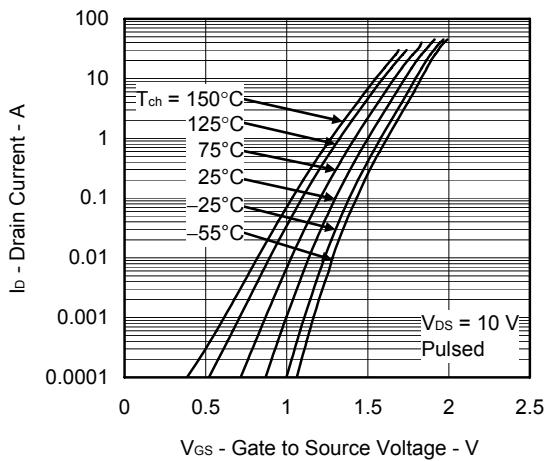
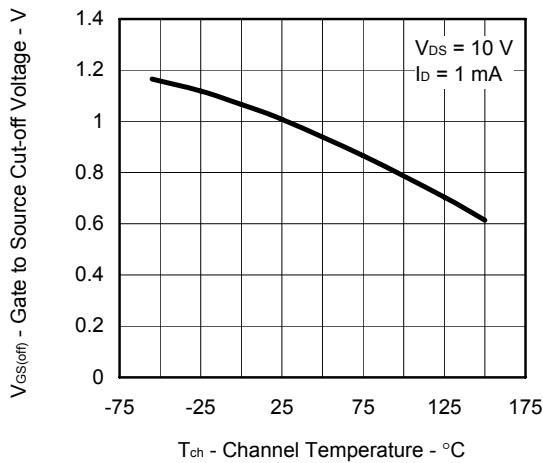
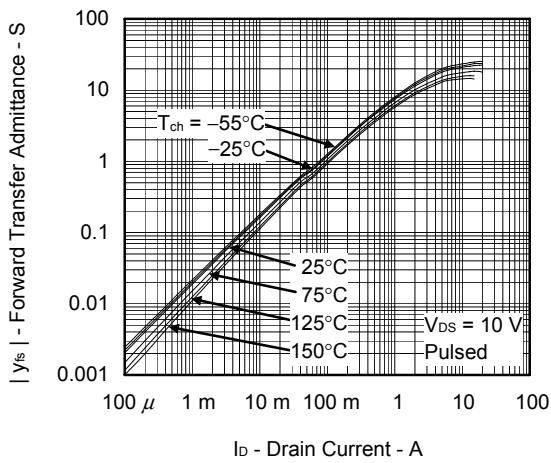
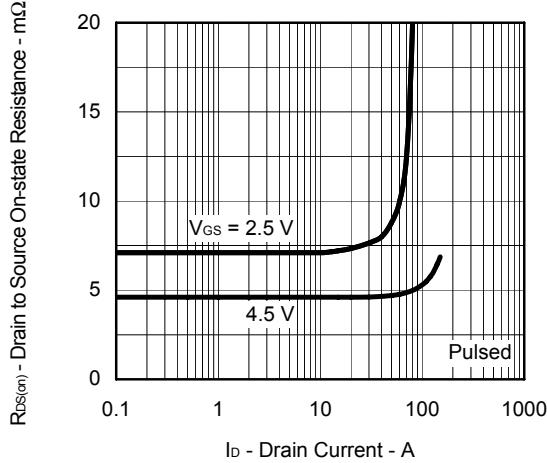
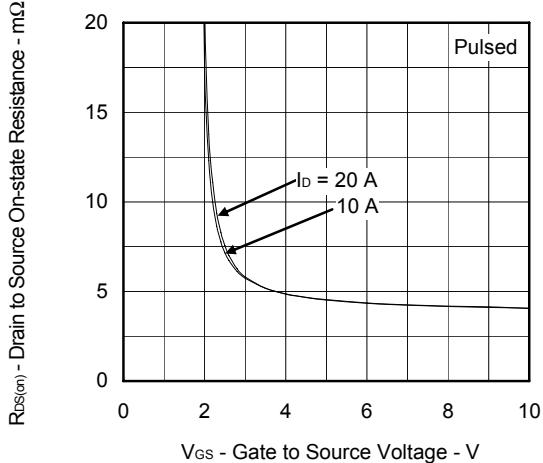
TEST CIRCUIT 3 GATE CHARGE



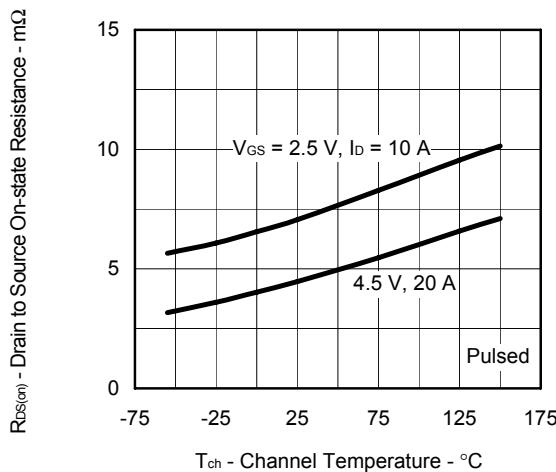
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)V_{DS} - Drain to Source Voltage - V

DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE

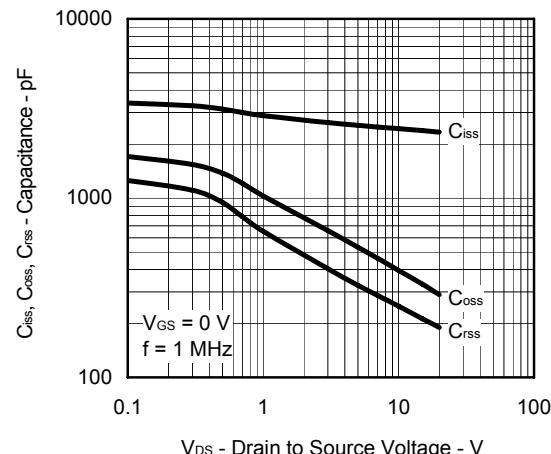
FORWARD TRANSFER CHARACTERISTICS

GATE TO SOURCE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATUREFORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENTDRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENTDRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE

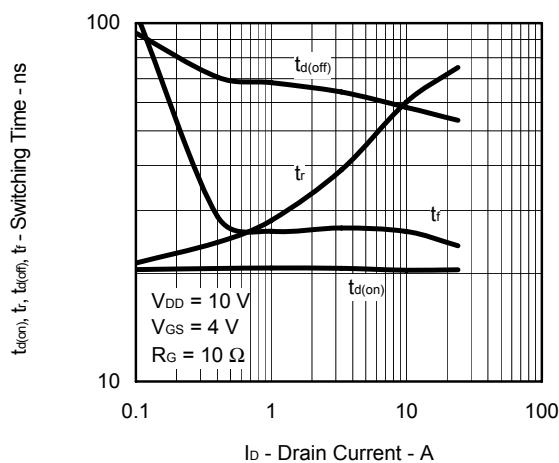
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



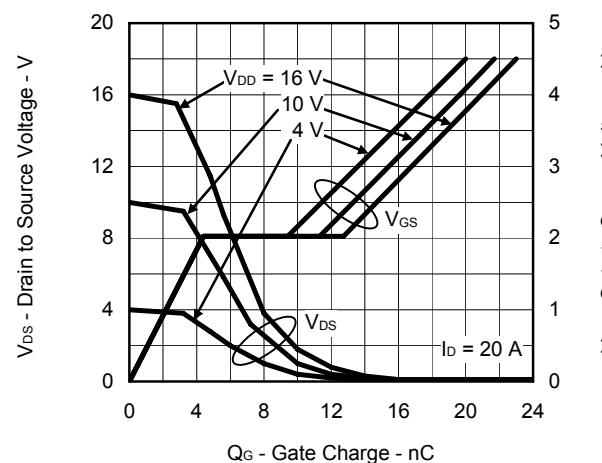
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



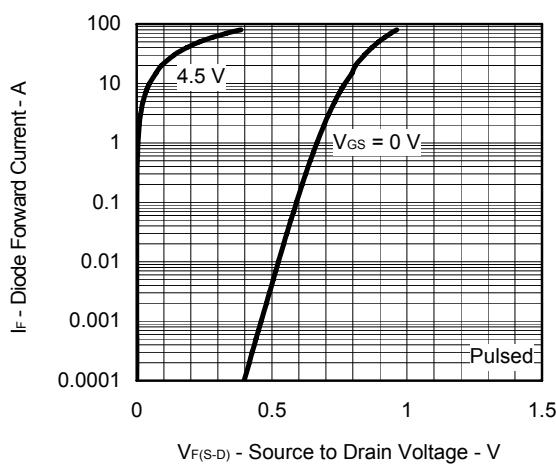
SWITCHING CHARACTERISTICS



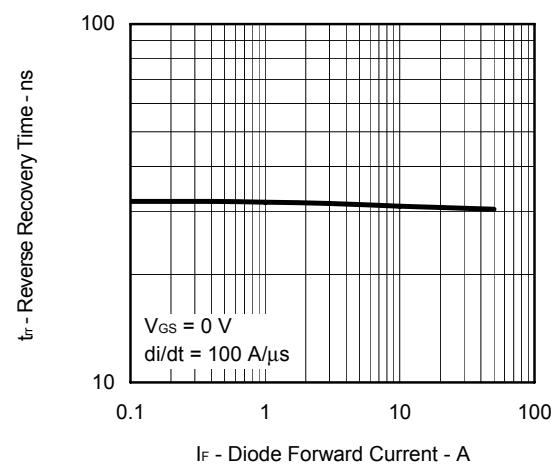
DYNAMIC INPUT/OUTPUT CHARACTERISTICS

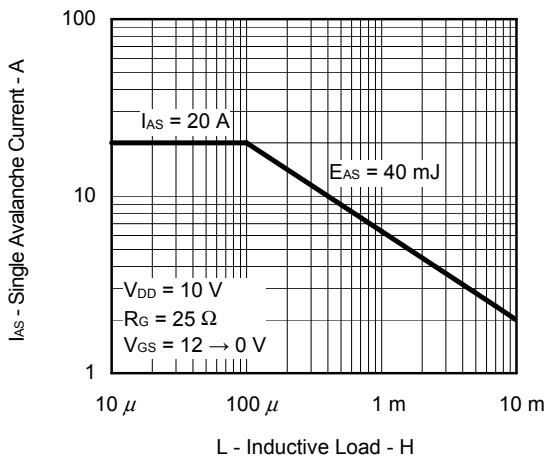
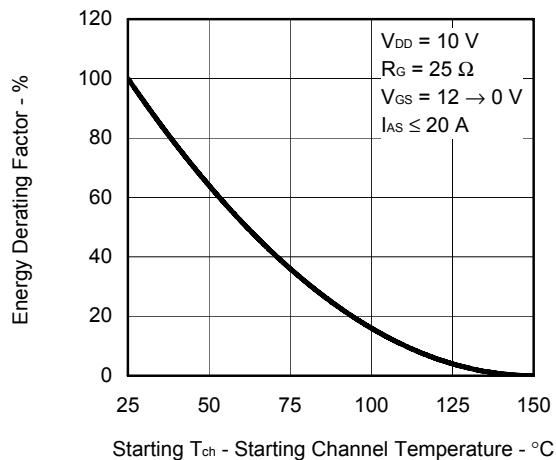


SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOADSINGLE AVALANCHE ENERGY
DERATING FACTOR

ORDERING INFORMATION

PART NUMBER	LEAD PLATING	PACKING	PACKAGE
μ PA2803T1L-E1-AY ^{Note}	Pure Sn	Tape 3000 p/reel	8-pin HVSON (3333)
μ PA2803T1L-E2-AY ^{Note}			0.028 g TYP.

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

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