DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR
μPA2803

SWITCHING
N-CHANNEL POWER MOSFET

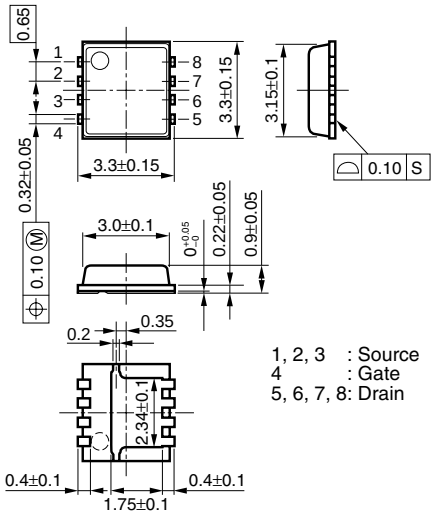
DESCRIPTION

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 mΩ MAX. (V_{GS} = 4.5 V, I_D = 20 A)
  $R_{DS(on)2}$ = 9.5 mΩ MAX. (V_{GS} = 2.5 V, I_D = 10 A)
- Built-in gate protection diode
- Thin type surface mount package with heat spreader
- RoHS Compliant

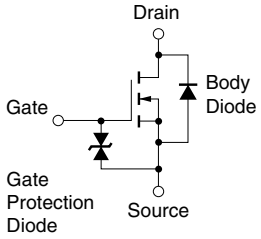
PACKAGE DRAWING (Unit: mm)



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

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	20	V
Gate to Source Voltage (V_{DS} = 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

EQUIVALENT CIRCUIT



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 x 25.4 mm x 0.8 mmt

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.

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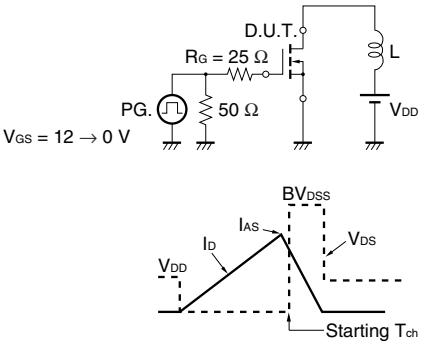
ELECTRICAL CHARACTERISTICS (T_A = 25°C, All terminals are connected.)

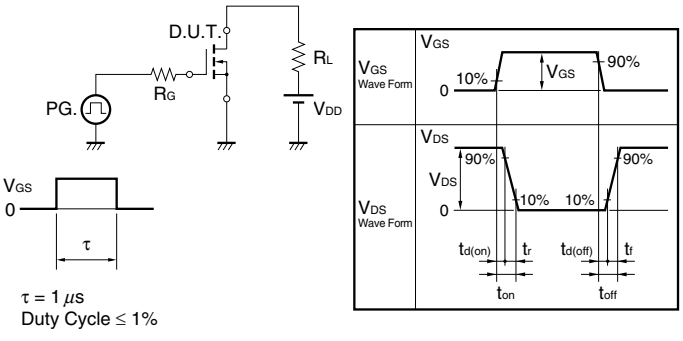
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±12 V, V_{DS} = 0 V			±10	μA
Gate to Source Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	0.5		1.5	V
Forward Transfer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

Note Pulsed

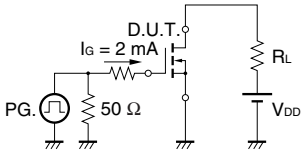
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

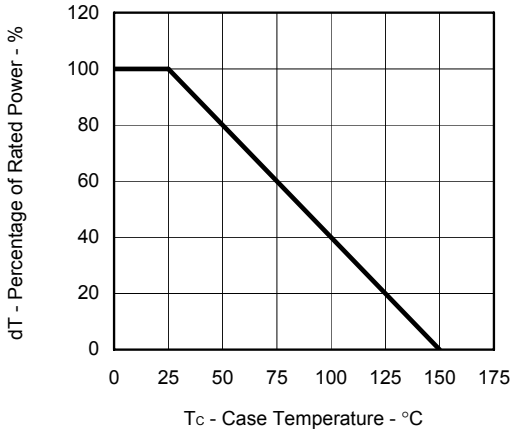


TEST CIRCUIT 3 GATE CHARGE

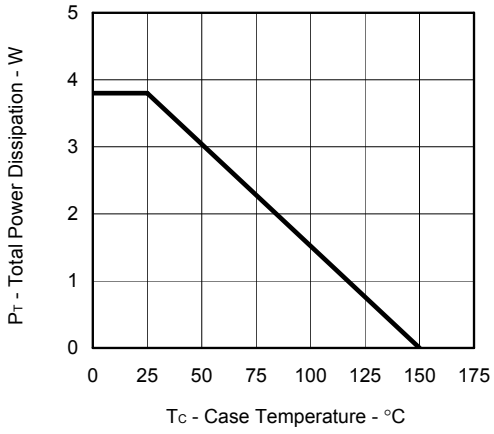


TYPICAL CHARACTERISTICS (T_A = 25°C)

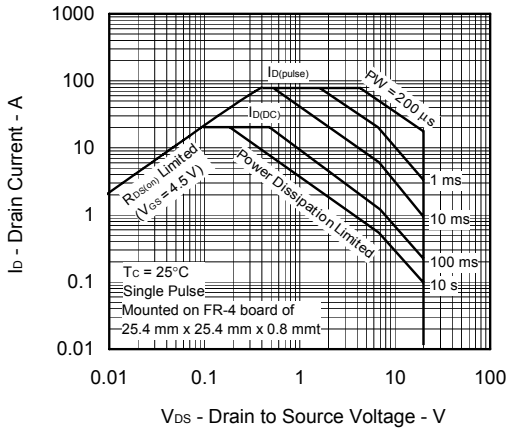
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



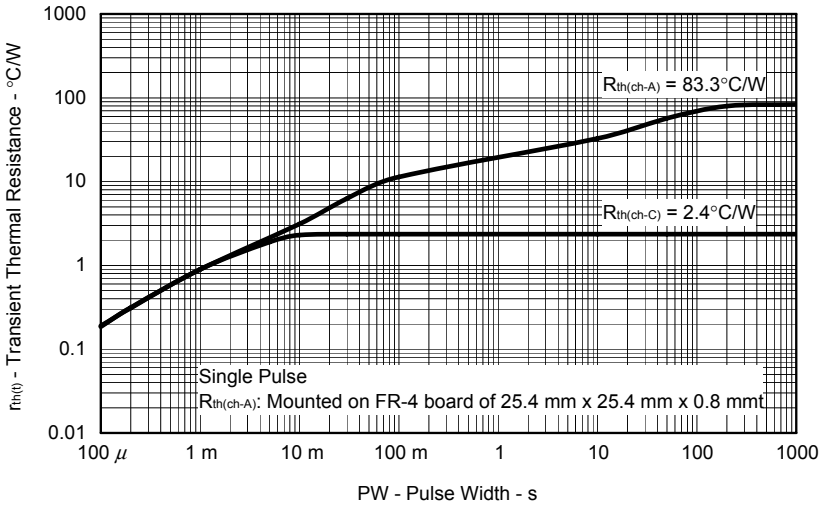
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



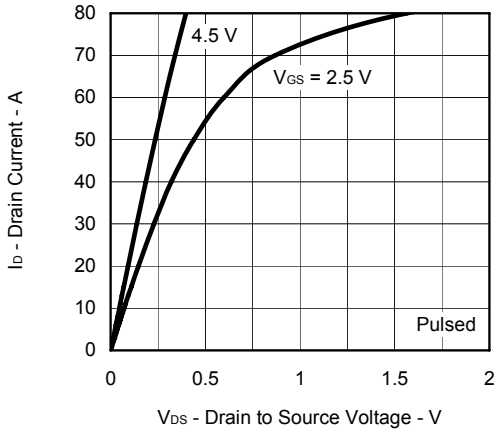
FORWARD BIAS SAFE OPERATING AREA



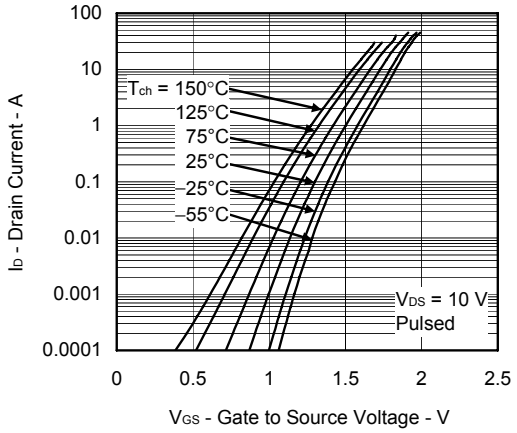
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



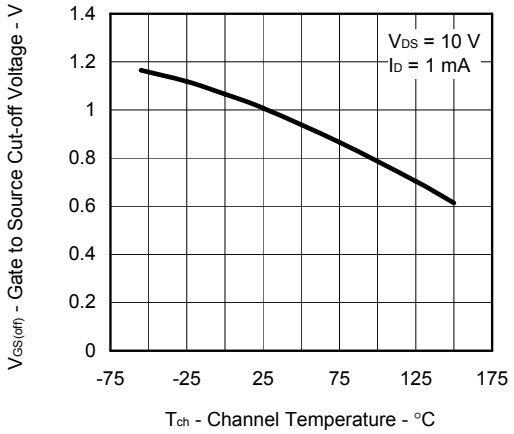
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



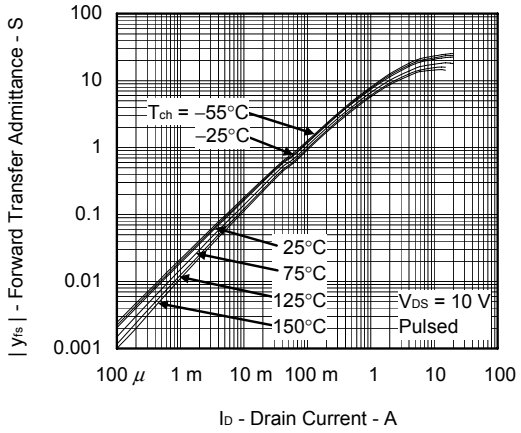
FORWARD TRANSFER CHARACTERISTICS



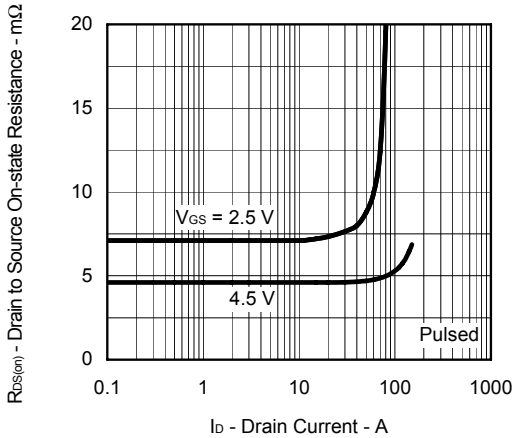
GATE TO SOURCE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



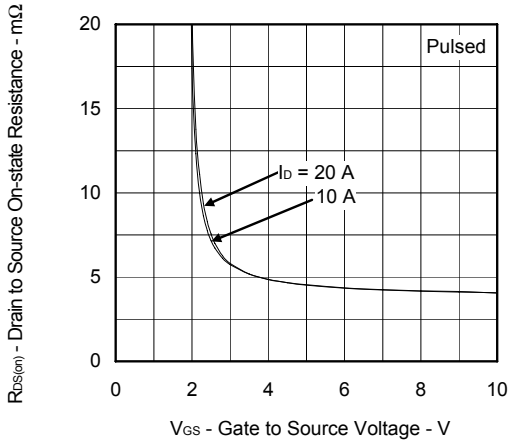
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



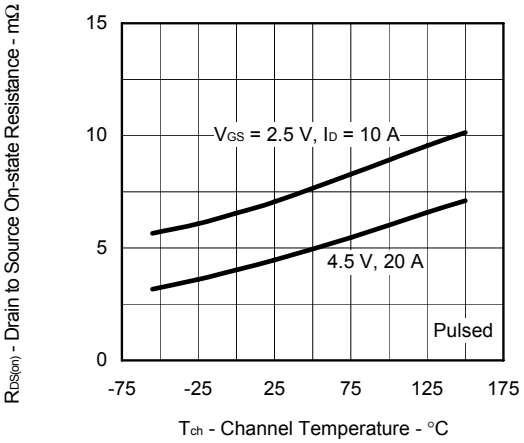
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



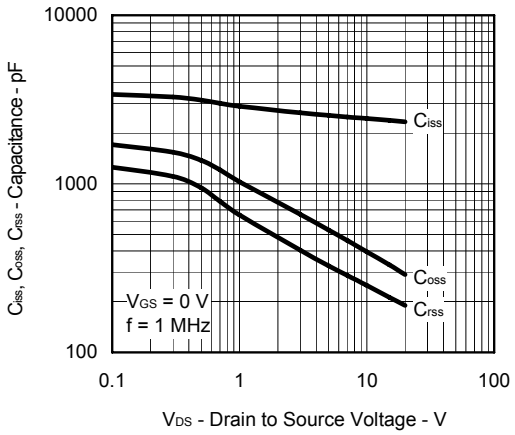
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



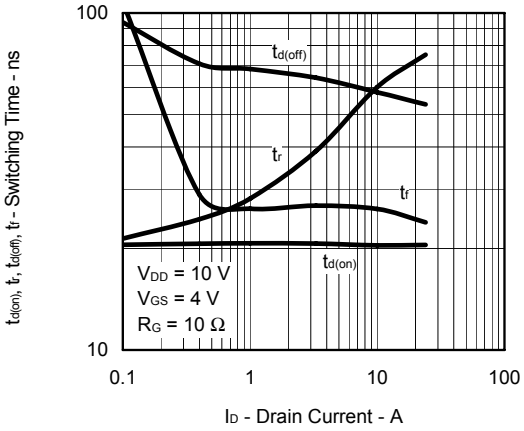
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



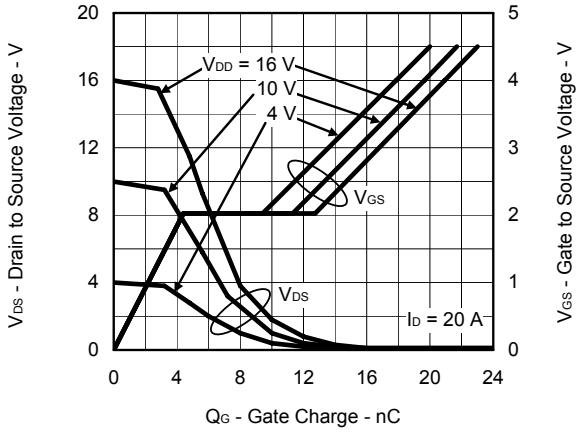
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



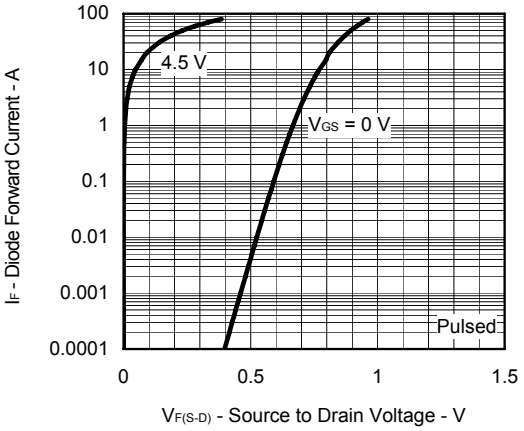
SWITCHING CHARACTERISTICS



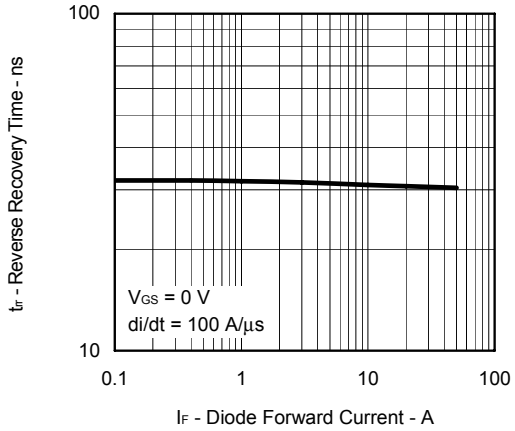
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



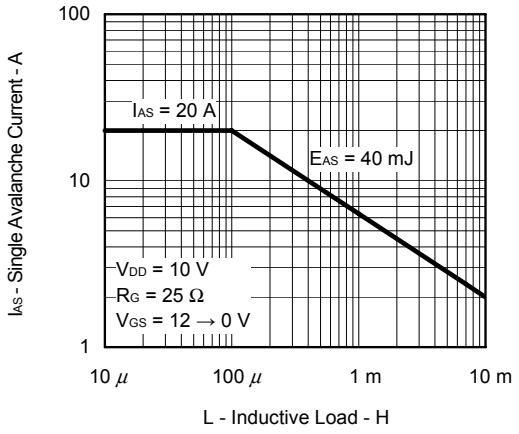
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



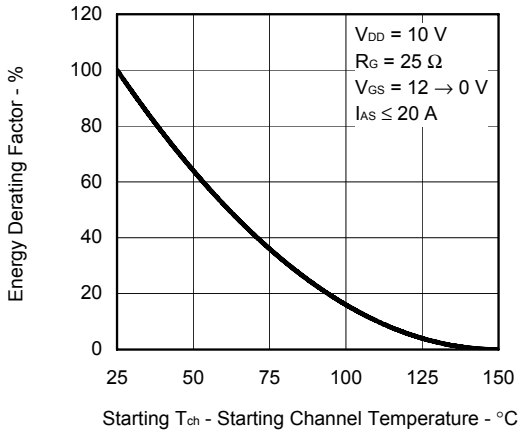
REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY
DERATING FACTOR



ORDERING INFORMATION

PART NUMBER	LEAD PLATING	PACKING	PACKAGE
μPA2803T1L-E1-AY Note	Pure Sn	Tape 3000 p/reel	8-pin HVSON (3333) 0.028 g TYP.
μPA2803T1L-E2-AY Note			

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

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