DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR

μPA1759

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The μPA1759 is Dual N-channel MOS Field Effect Transistor designed for DC/DC converters.

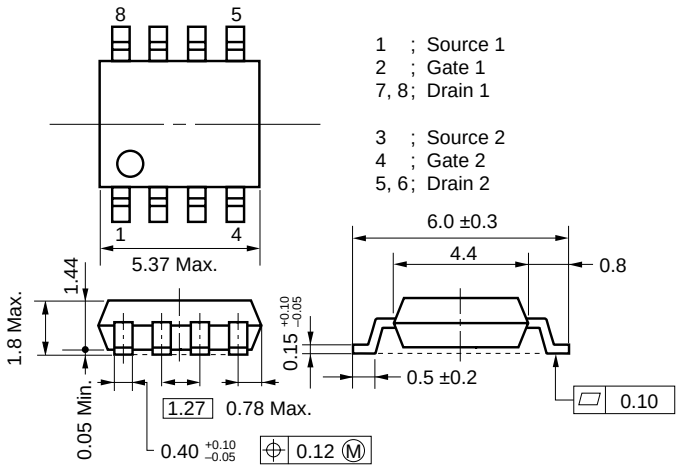
FEATURES

- Dual chip type
- Low on-resistance
  $R_{DS(on)1}$ = 110 mΩ TYP. (V_{GS} = 10 V, I_D = 2.5 A)
  $R_{DS(on)2}$ = 170 mΩ TYP. (V_{GS} = 4 V, I_D = 2.5 A)
- Low input capacitance C_{iss} = 190 pF TYP.
- Built-in G-S protection diode
- Small and surface mount package (Power SOP8)

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1759G	Power SOP8

PACKAGE DRAWING (Unit : mm)

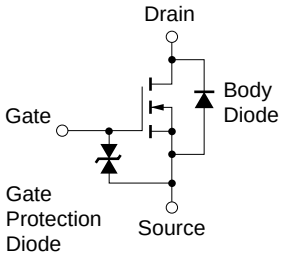


ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, All terminals are connected.)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	60	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±20	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)}$	±5.0	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±20	A
Total Power Dissipation (1 unit) Note2	P_T	1.7	W
Total Power Dissipation (2 unit) 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}	2.5	A
Single Avalanche Energy Note3	E_{AS}	0.625	mJ

EQUIVALENT CIRCUIT

(1/2 Circuit)



Notes 1. PW ≤ 10 μs, Duty cycle ≤ 1 %

2. Mounted on ceramic substrate of 2000 mm^2 x 2.25 mm

3. Starting T_{ch} = 25 °C, V_{DD} = 30 V, R_G = 25 Ω, 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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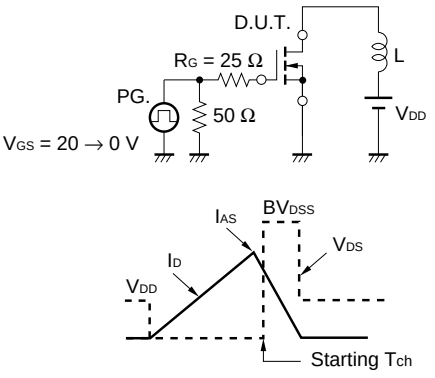
The mark ★ shows major revised points.

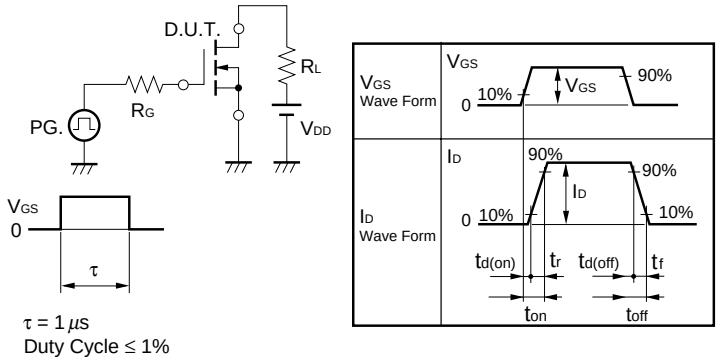
ELECTRICAL CHARACTERISTICS (T_A = 25 °C, All terminals are connected.)

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	1.0	1.7	2.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 2.5 A	2.0	3.9		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 2.5 A		110	150	mΩ
	$R_{DS(on)2}$	V_{GS} = 4 V, I_D = 2.5 A		170	240	mΩ
Input Capacitance	C_{iss}	V_{DS} = 10 V		190		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		100		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		36		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 30 V		6		ns
Rise Time	t_r	I_D = 2.5 A		50		ns
Turn-off Delay Time	$t_{d(off)}$	V_{GS} = 10 V		80		ns
Fall Time	t_f	R_G = 10 Ω		50		ns
Total Gate Charge	Q_G	V_{DD} = 48 V		8		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 10 V		1		nC
Gate to Drain Charge	Q_{GD}	I_D = 5.0 A		2.4		nC
Body Diode forward Voltage	$V_{F(S-D)}$	I_F = 5.0 A, V_{GS} = 0 V		0.9		V
Reverse Recovery Time	t_{rr}	I_F = 5.0 A, V_{GS} = 0 V		40		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		50		nC

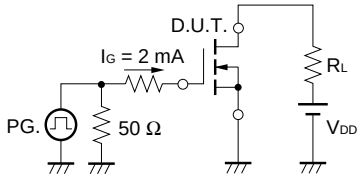
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

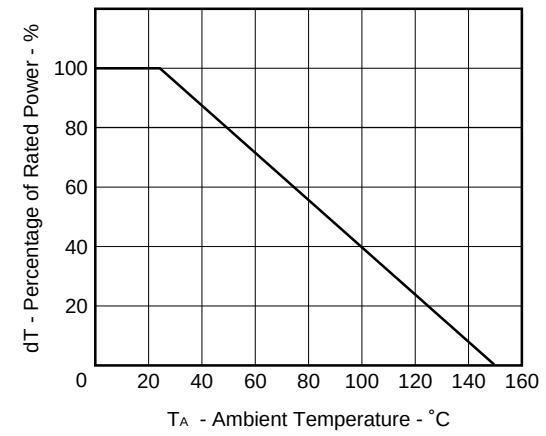


TEST CIRCUIT 3 GATE CHARGE

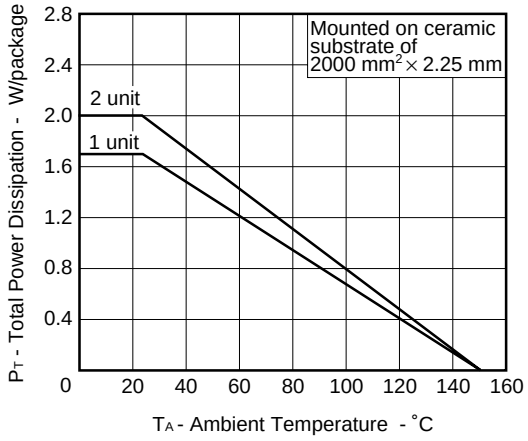


★ TYPICAL CHARACTERISTICS (T_A = 25°C, All terminals are connected.)

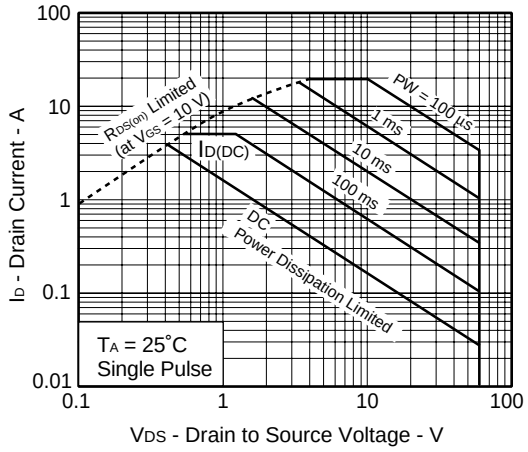
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



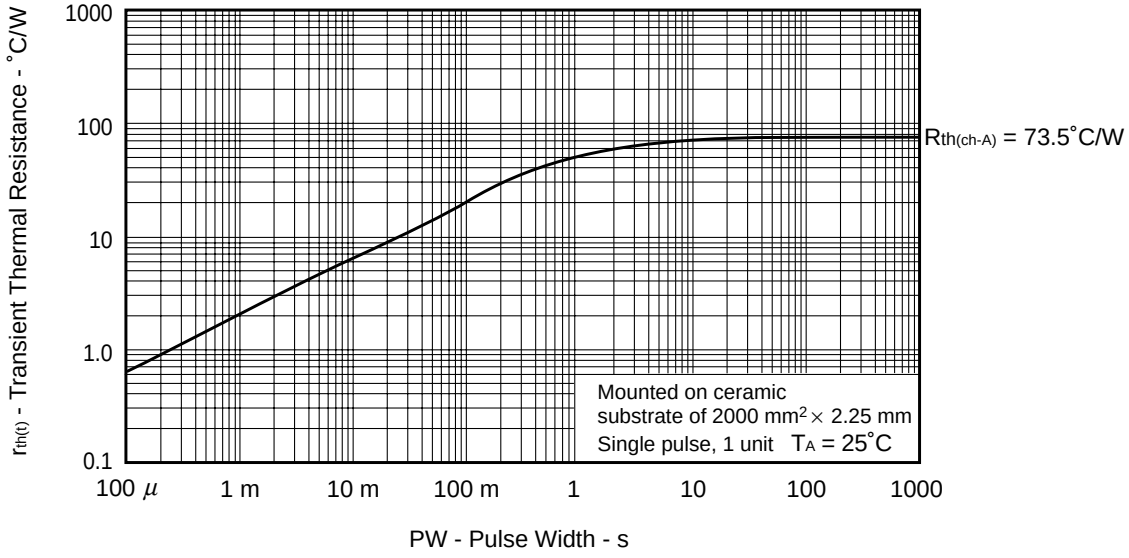
FORWARD BIAS SAFE OPERATING AREA



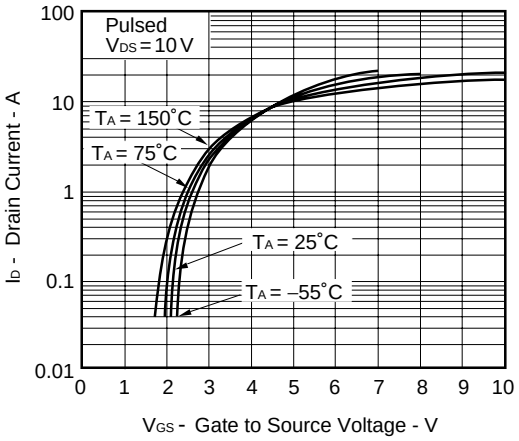
Remark

Mounted on ceramic substrate of 2000 mm^2 × 2.25 mm

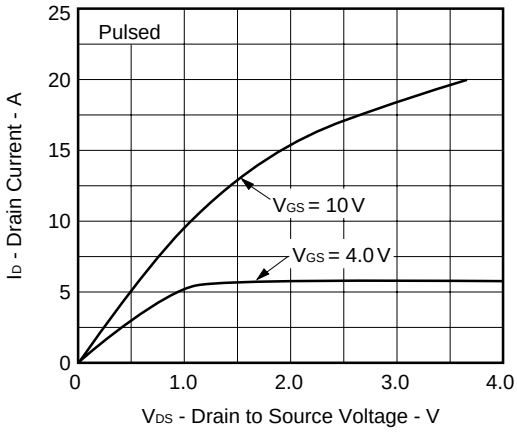
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



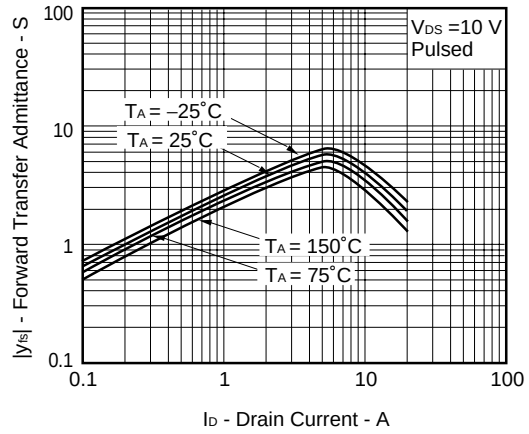
FORWARD TRANSFER CHARACTERISTICS



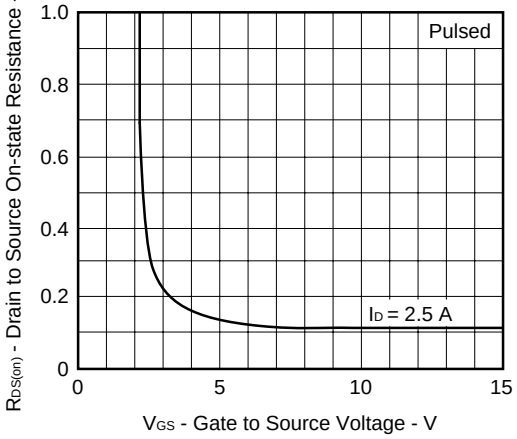
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



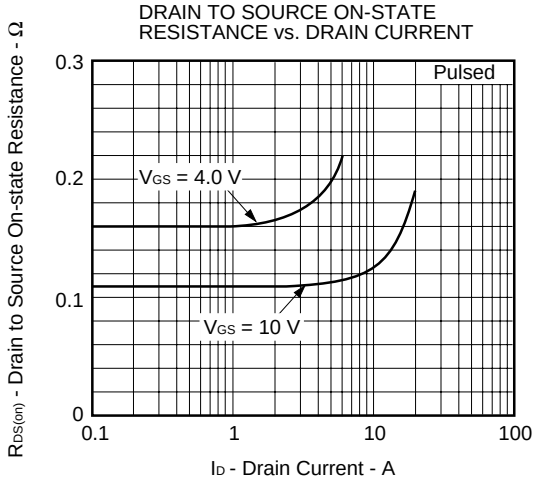
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



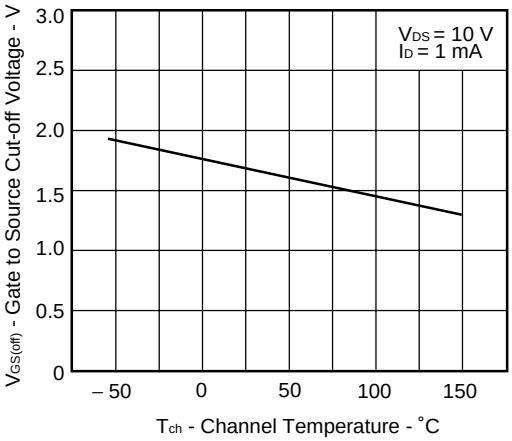
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



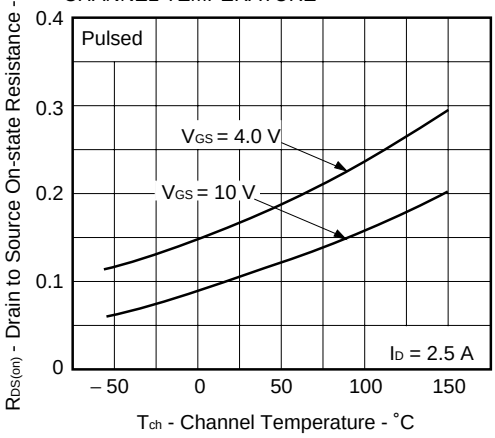
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



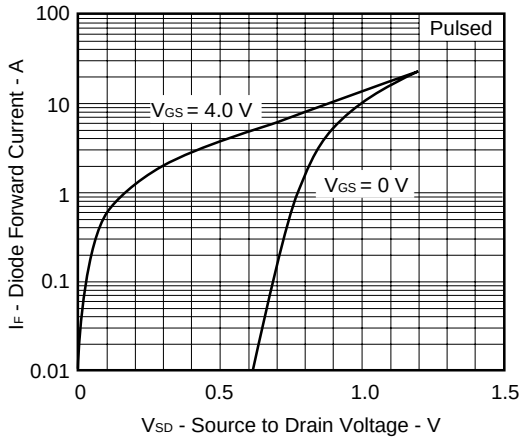
GATE TO SOURCE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



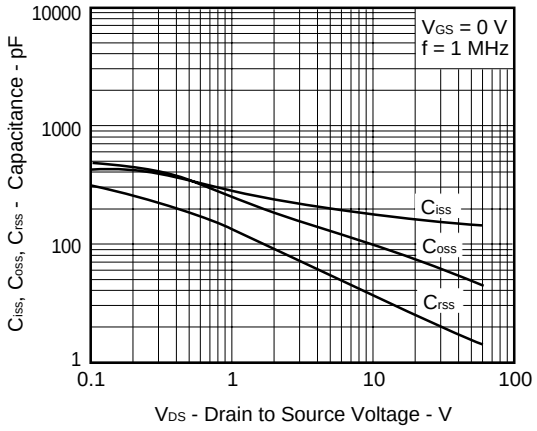
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



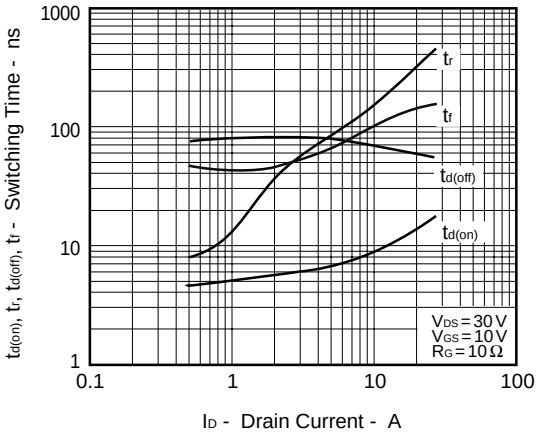
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



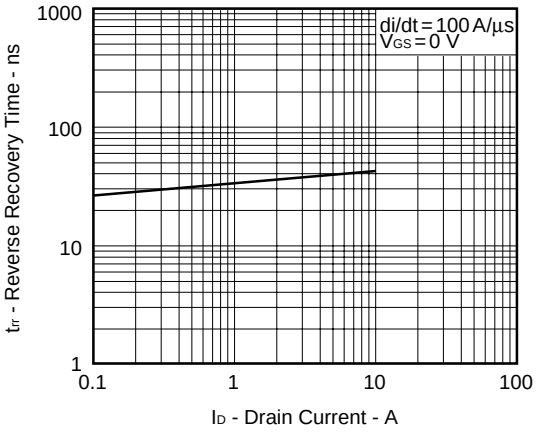
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



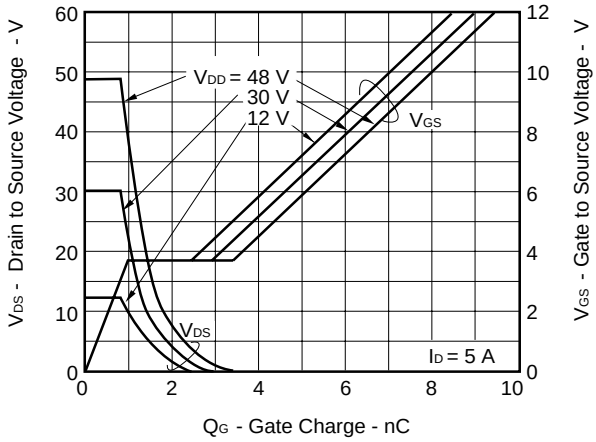
SWITCHING CHARACTERISTICS



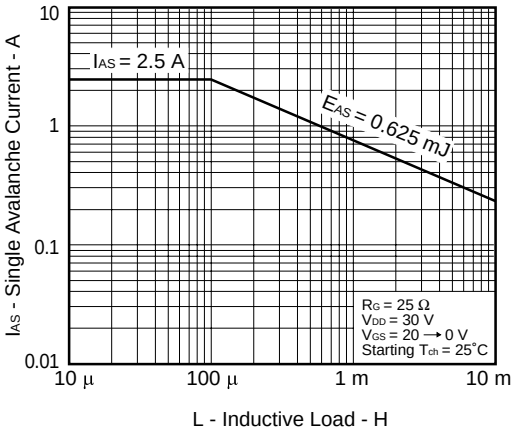
REVERSE RECOVERY TIME vs. DRAIN CURRENT



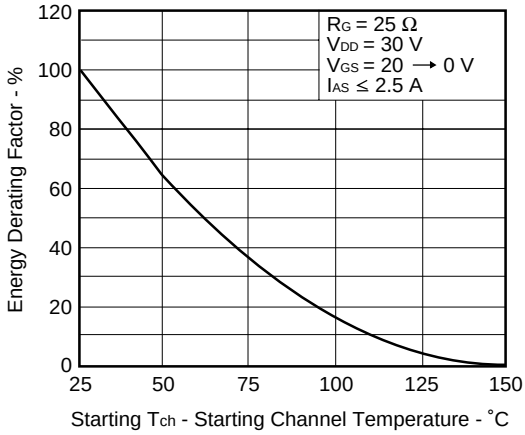
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY
DERATING FACTOR



[MEMO]

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