NEC

MOS FIELD EFFECT TRANSISTOR

μPA1764

SWITCHING
DUAL N-CHANNEL POWER MOS FET
INDUSTRIAL USE

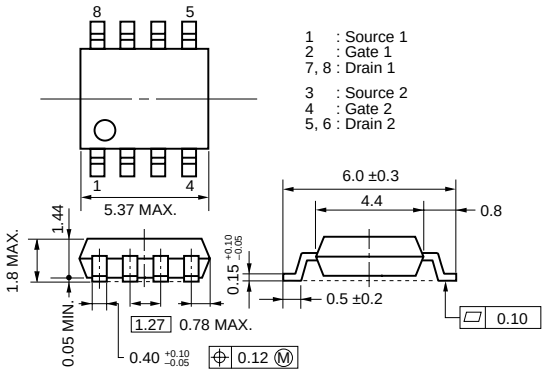
DESCRIPTION

The μPA1764 is N-Channel MOS Field Effect Transistor designed for high current switching applications.

FEATURES

- Dual chip type
- Low on-state resistance
  $R_{DS(on)1}$ = 27 mΩ TYP. (V_{GS} = 10 V, I_D = 3.5 A)
  $R_{DS(on)2}$ = 32 mΩ TYP. (V_{GS} = 4.5 V, I_D = 3.5 A)
  $R_{DS(on)3}$ = 34 mΩ TYP. (V_{GS} = 4.0 V, I_D = 3.5 A)
- Low input capacitance
  C_{iss} = 1300 pF TYP.
- Built-in G-S protection diode
- Small and surface mount package (Power SOP8)

PACKAGE DRAWING (Unit : mm)



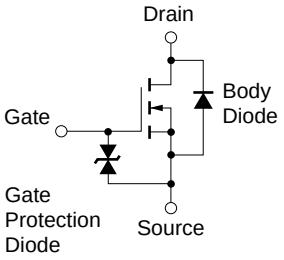
ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1764G	Power SOP8

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)	$I_{D(DC)}$	±7	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±28	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}	7	A
Single Avalanche Energy Note3	E_{AS}	98	mJ

EQUIVALENT CIRCUIT
(1/2 Circuit)



Notes 1. PW ≤ 10 μs, Duty cycle ≤ 1%

2. T_A = 25°C, Mounted on ceramic substrate of 1200 mm² x 2.2 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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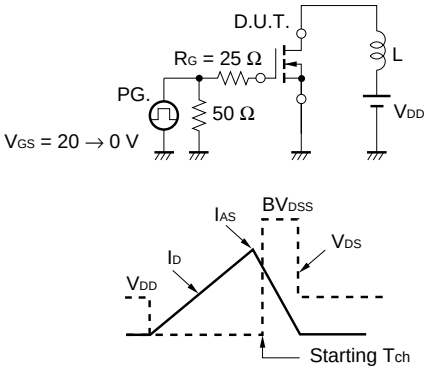
The mark ★ shows major revised points.

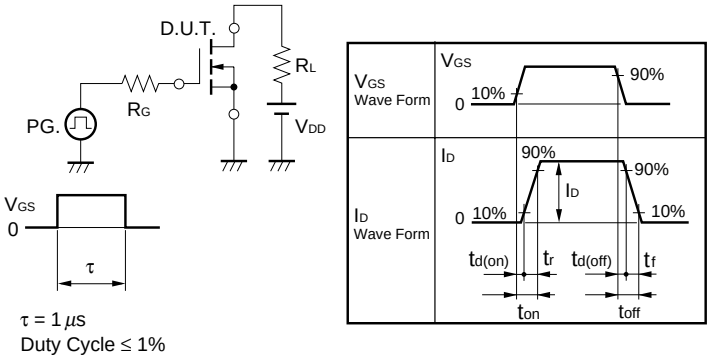
ELECTRICAL CHARACTERISTICS (T_A = 25°C, All terminals are connected.)

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	1.5	2.0	2.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 3.5 A	5.0	9.0		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 3.5 A		27	35	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.5 V, I_D = 3.5 A		32	42	mΩ
	$R_{DS(on)3}$	V_{GS} = 4.0 V, I_D = 3.5 A		34	46	mΩ
Input Capacitance	C_{iss}	V_{DS} = 10 V		1300		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		230		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		110		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 30 V, I_D = 3.5 A		15		ns
Rise Time	t_r	V_{GS} = 10 V		69		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		65		ns
Fall Time	t_f			27		ns
Total Gate Charge	Q_G	V_{DD} = 48 V		29		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 10 V		3.6		nC
Gate to Drain Charge	Q_{GD}	I_D = 7.0 A		7.4		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 7.0 A, V_{GS} = 0 V		0.84		V
Reverse Recovery Time	t_{rr}	I_F = 7.0 A, V_{GS} = 0 V		40		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		66		nC

TEST CIRCUIT 1 AVALANCHE CAPABILITY

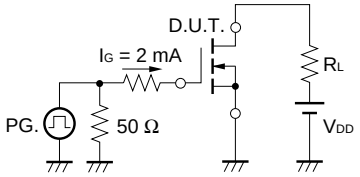


TEST CIRCUIT 2 SWITCHING TIME



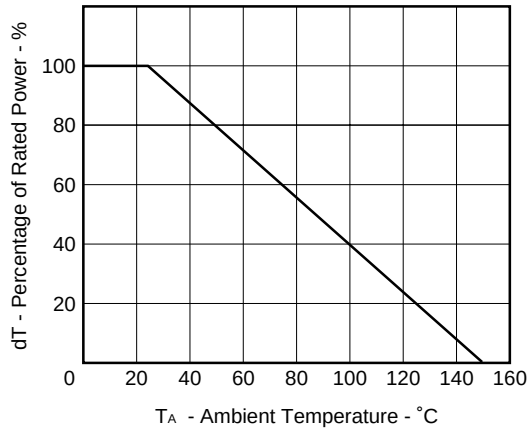
τ = 1 μs
Duty Cycle ≤ 1%

TEST CIRCUIT 3 GATE CHARGE

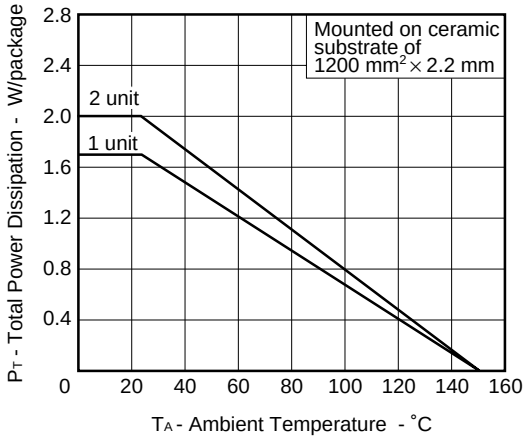


TYPICAL CHARACTERISTICS (T_A = 25°C, All terminals are connected.)

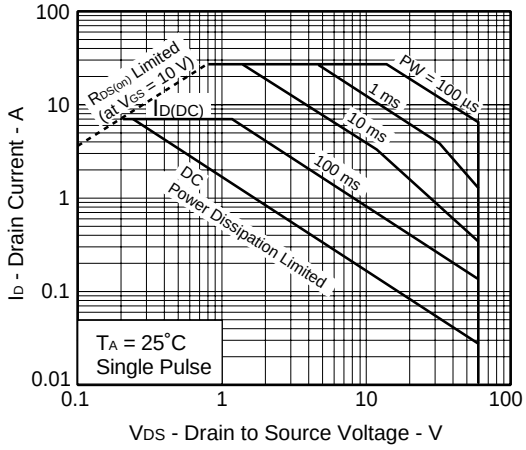
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



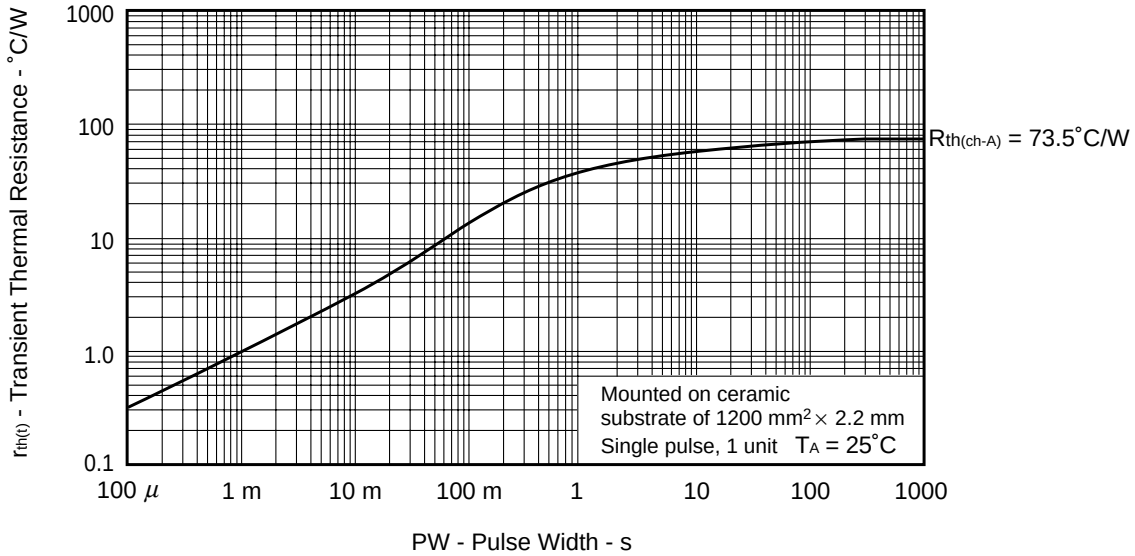
★ FORWARD BIAS SAFE OPERATING AREA



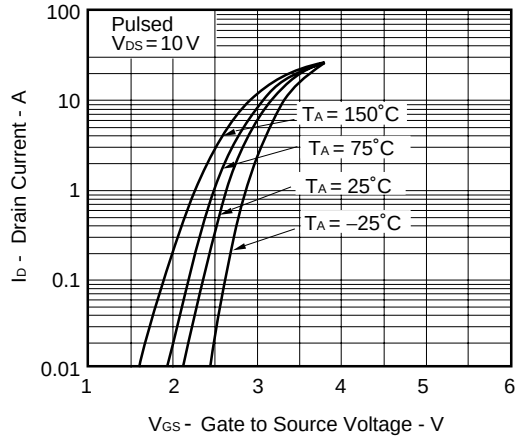
Remark

Mounted on ceramic substrate of 1200 mm^2 × 2.2 mm

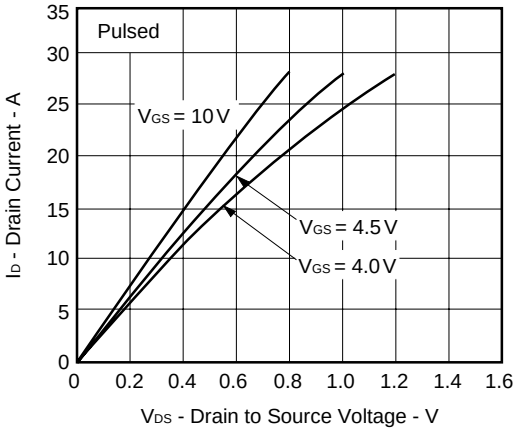
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



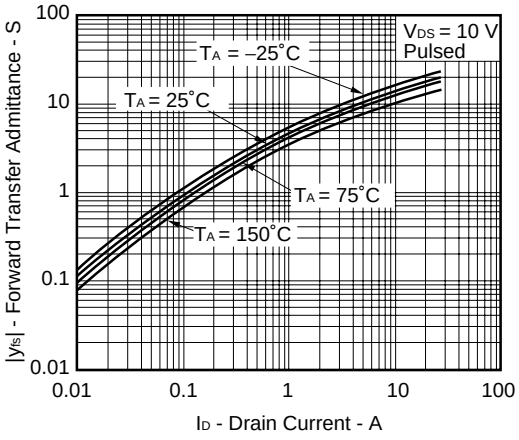
FORWARD TRANSFER CHARACTERISTICS



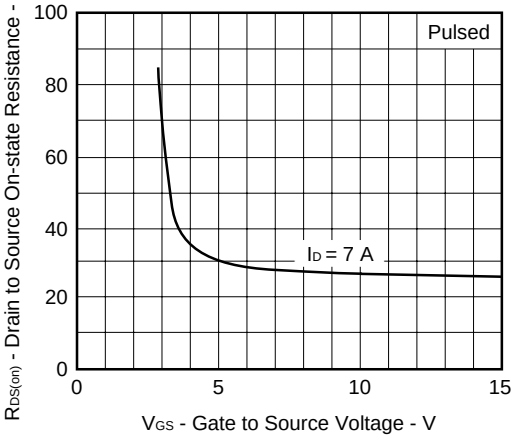
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



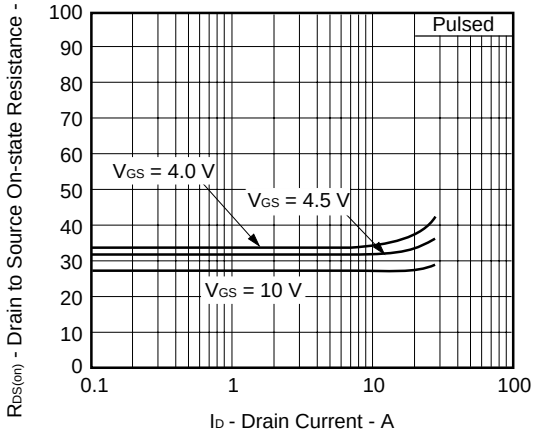
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



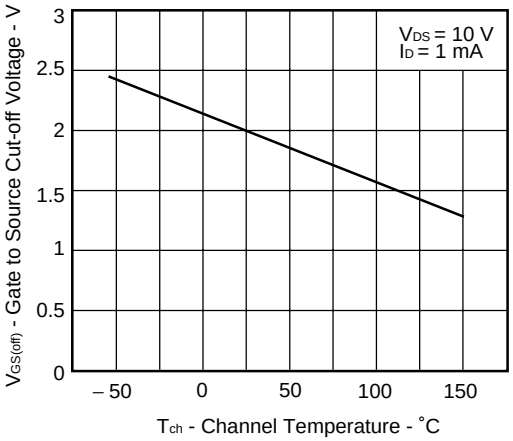
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



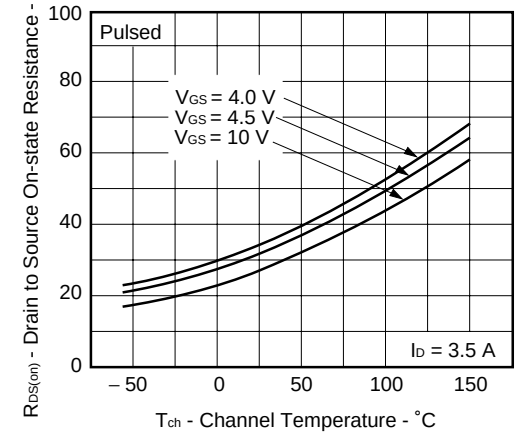
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



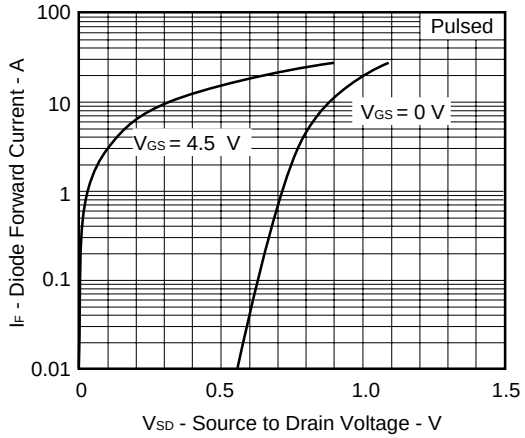
GATE TO SOURCE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



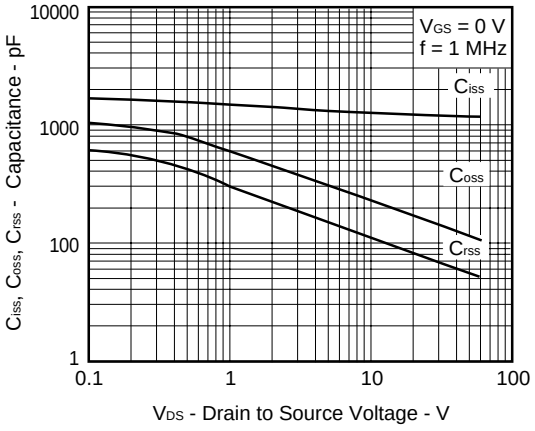
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



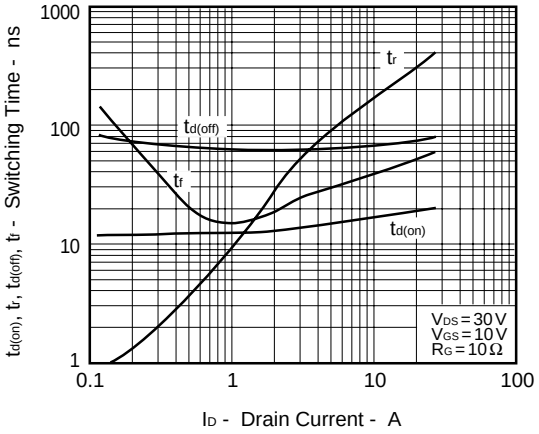
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



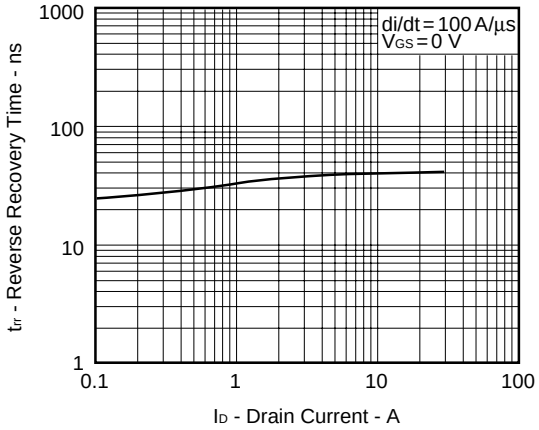
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



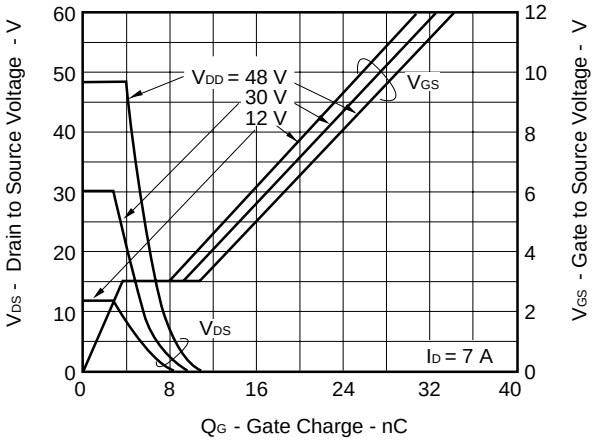
SWITCHING CHARACTERISTICS



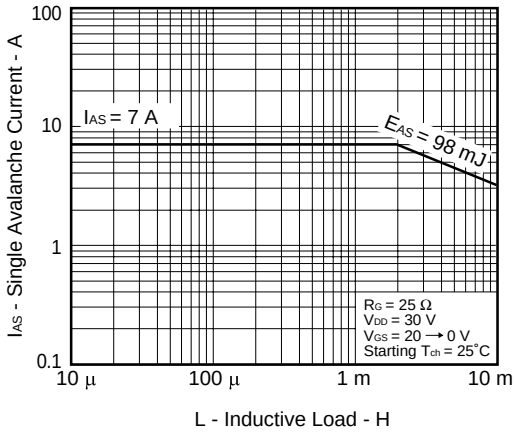
REVERSE RECOVERY TIME vs. DRAIN CURRENT



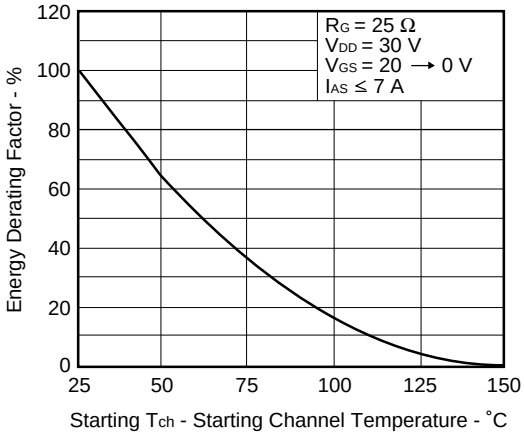
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY
DERATING FACTOR



[MEMO]

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