

**N-CHANNEL POWER MOS FET ARRAY
SWITCHING USE**

DESCRIPTION

The μPA1500B is N-channel Power MOS FET Array that built in 4 circuits and surge absorber designed for solenoid, motor and lamp driver.

FEATURES

- 4 V driving is possible
- Large Current and Low On-state Resistance
 $I_{D(DC)} = \pm 3 \text{ A}$
 $R_{DS(on)1} \leq 0.18 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 2 \text{ A)}$
 $R_{DS(on)2} \leq 0.24 \Omega \text{ MAX. (} V_{GS} = 4 \text{ V, } I_D = 2 \text{ A)}$
- Low Input Capacitance $C_{iss} = 200 \text{ pF TYP.}$
- Surge Absorber, built in

ORDERING INFORMATION

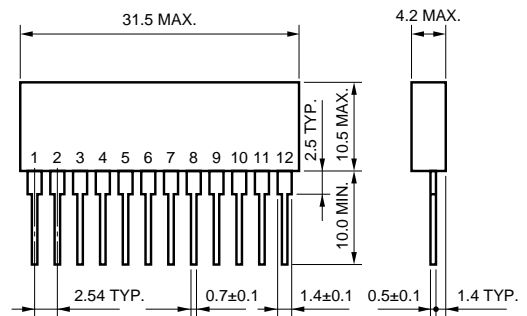
Type Number	Package
μPA1500BH	12 Pin SIP

ABSOLUTE MAXIMUM RATINGS (TA = 25 °C)

Drain to Source Voltage	V_{DSS} Note 1	60	V
Gate to Source Voltage	V_{GSS} Note 2	±20	V
Drain Current (DC)	$I_{D(DC)}$	±3.0	A/unit
Drain Current (pulse)	$I_{D(pulse)}$ Note 3	±12	A/unit
Repetitive peak Reverse Voltage	V_{RRM} Note 4	65	V
Diode Forward Current	$I_{F(av)}$ Note 4	3.0	A/unit
Total Power Dissipation	P_{T1} Note 5	28	W
Total Power Dissipation	P_{T2} Note 6	4.0	W
Channel Temperature	T_{CH}	150	°C
Storage Temperature	T_{stg}	-55 to 150	°C
Single Avalanche Current	I_{AS} Note 7	3.0	A
Single Avalanche Energy	E_{AS} Note 7	0.9	mJ

- Notes**
1. $V_{GS} = 0$
 2. $V_{DS} = 0$
 3. $PW \leq 10 \mu s, \text{ Duty Cycle} \leq 1 \%$
 4. Rating of Surge Absorber
 5. 4 Circuits, $T_C = 25 \text{ °C}$
 6. 4 Circuits, $T_A = 25 \text{ °C}$
 7. Starting $T_{CH} = 25 \text{ °C}, V_{DD} = 30 \text{ V}, V_{GS} = 20 \text{ V} \rightarrow 0,$
 $R_G = 25 \Omega, L = 100 \mu H$

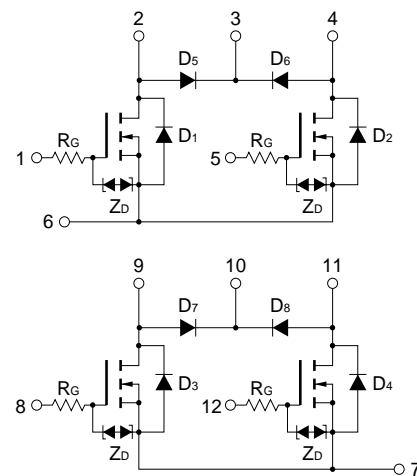
**PACKAGE DIMENSIONS
(in millimeters)**



ELECTRODE CONNECTION

- 1, 5, 8, 12 GATE
- 2, 4, 9, 11 DRAIN, ANODE
- 6, 7 SOURCE
- 3, 10 CATHODE

CONNECTION DIAGRAM



- D1 to D4 : Body Diode
- D5 to D8 : Surge Absorber
- Zb : Gate to Source Protection Diode
- Rg : Gate Input Resistance 330 Ω TYP.

The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device is actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

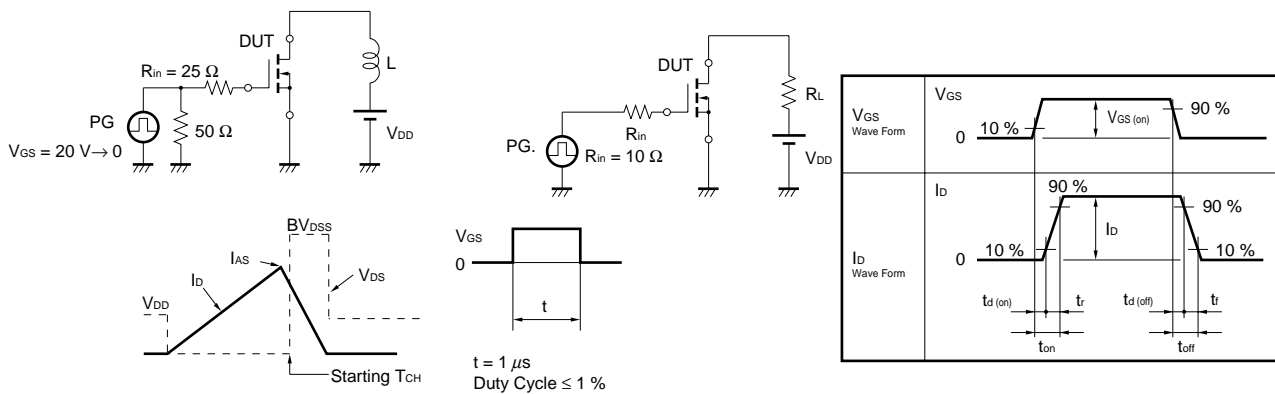
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain Leakage Current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0			10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0			±10	μA
Gate Cutoff Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1.0 mA	1.0		2.0	V
Forward Transfer Admittance	Y _{fs}	V _{GS} = 10 V, I _D = 2.0 A	2.0			S
Drain to Source On-State Resistance	R _{DS(on)1}	V _{GS} = 10 V, I _D = 2.0 A		0.10	0.18	Ω
	R _{DS(on)2}	V _{GS} = 4.0 V, I _D = 2.0 A		0.14	0.24	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0, f = 1.0 MHz		200		pF
Output Capacitance	C _{oss}			150		pF
Reverse Transfer Capacitance	C _{rss}			55		pF
Turn-on Delay Time	t _{d(on)}	I _D = 2.0 A, V _{GS} = 10 V, V _{DD} ≐ 30 V, R _L = 15 Ω		20		ns
Rise Time	t _r			100		ns
Turn-off Delay Time	t _{d(off)}			735		ns
Fall Time	t _f			350		ns
Total Gate Charge	Q _G	V _{GS} = 10 V, I _D = 3.0 A, V _{DD} = 48 V		13		nC
Gate to Source Charge	Q _{GS}			2		nC
Gate to Drain Charge	Q _{GD}			4.7		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 3 A, V _{GS} = 0		1.0		V

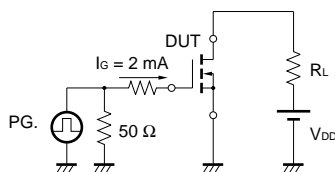
SURGE ABSORBER (Diode, builtin) 1 Unit

Repetitive peak Reverse Current	I _{RRM}	V _R = 65 V			10	μA
Diode Forward Voltage	V _F	I _F = 3.0 A			1.5	V

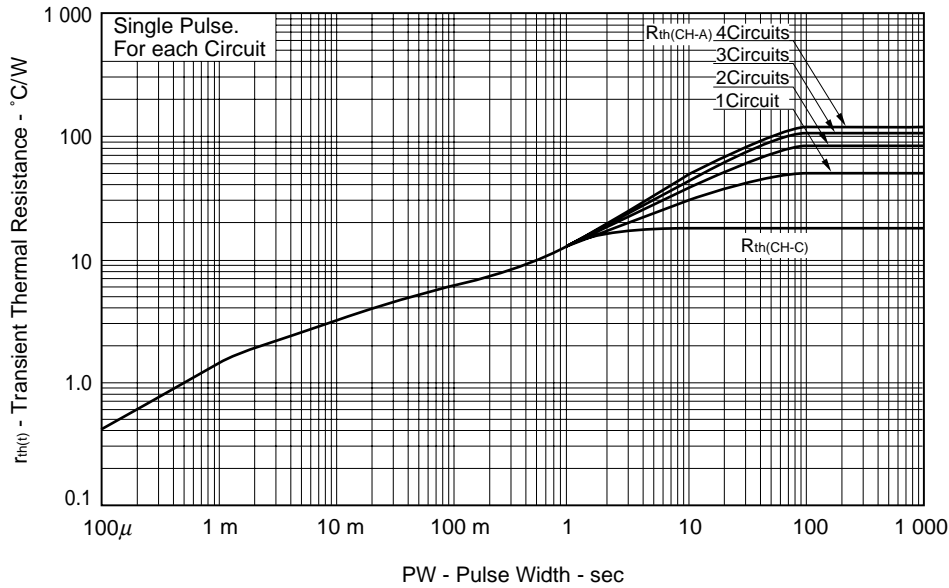
Test Circuit 1 Avalanche Capability Test Circuit 2 Switching Time



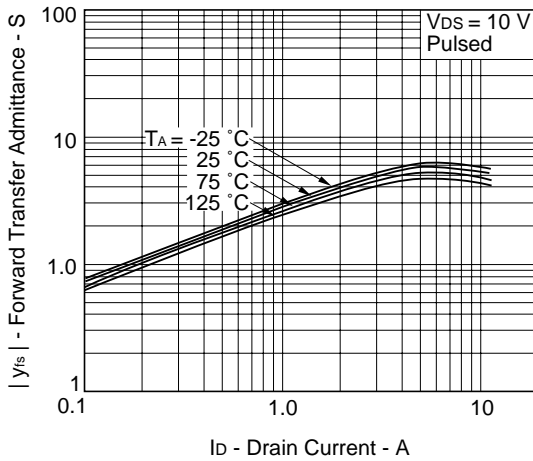
Test Circuit 3 Gate Charge



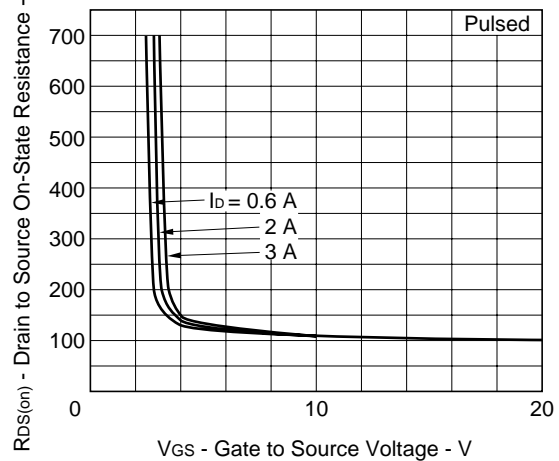
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



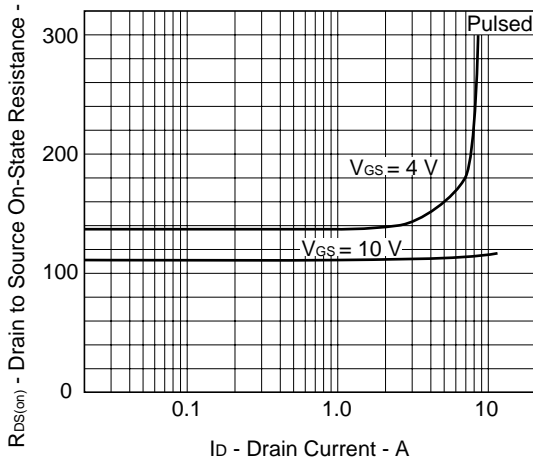
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



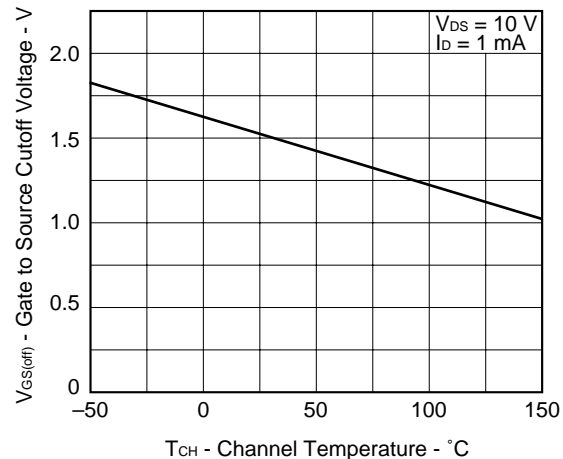
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

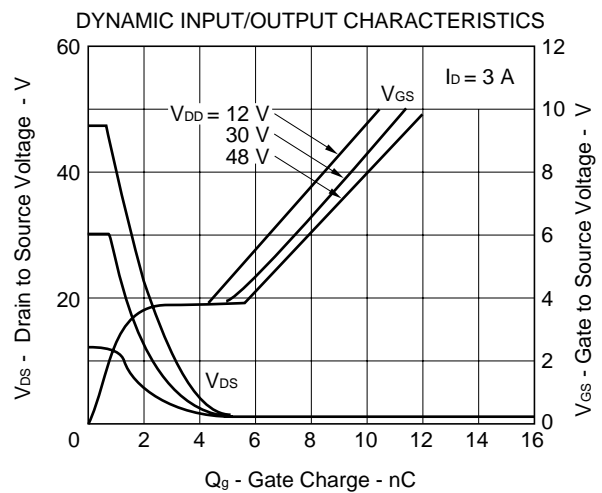
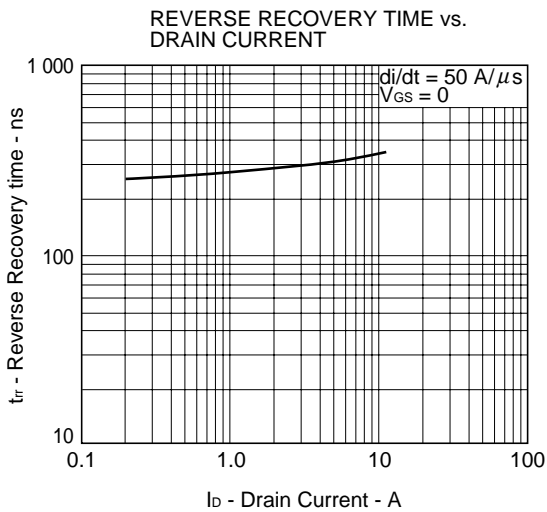
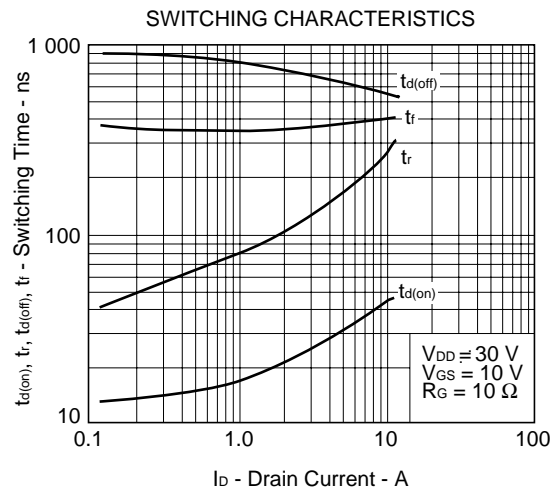
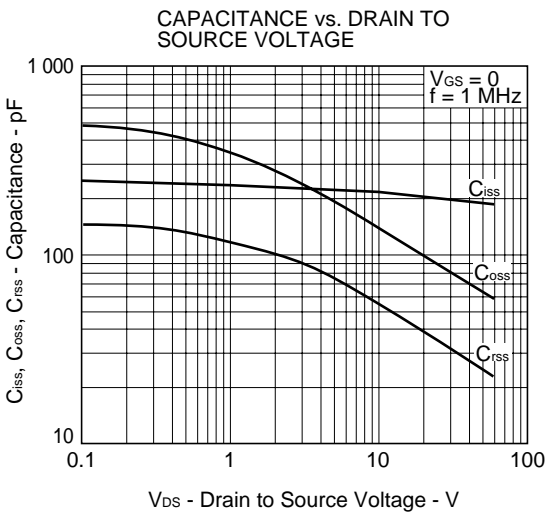
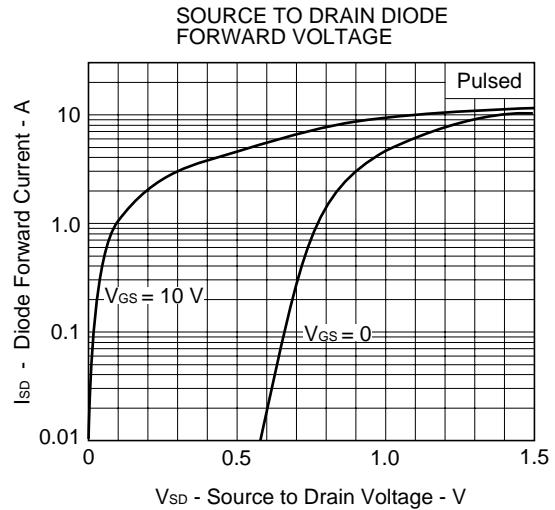
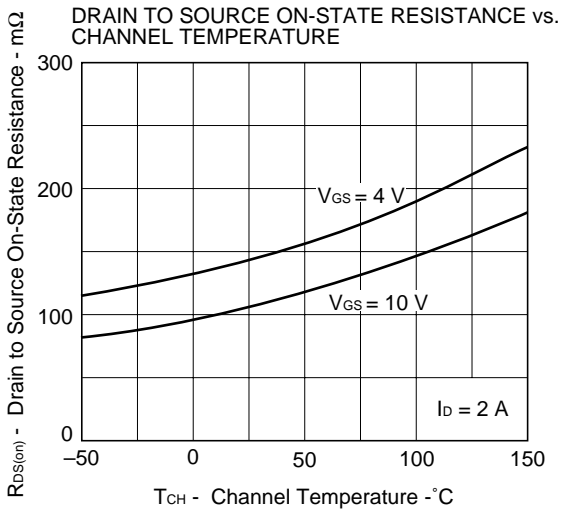


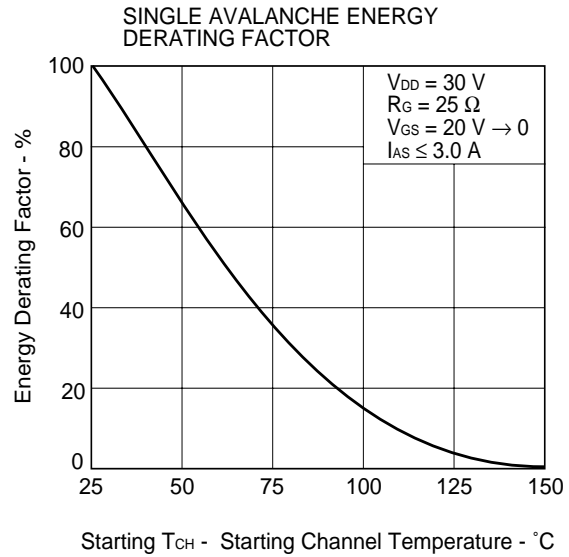
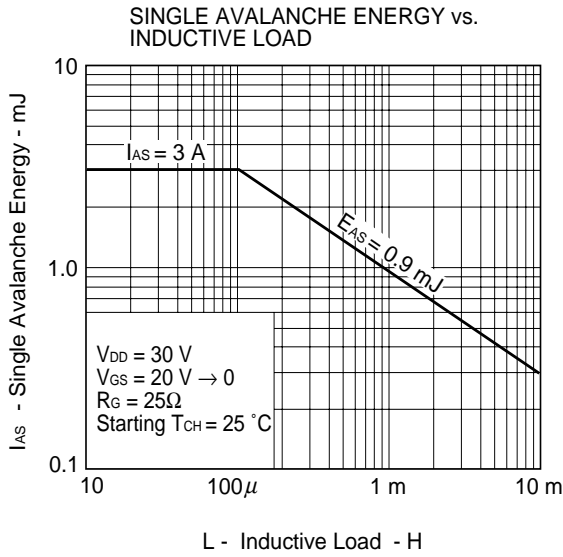
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE







REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system	TEI-1202
Quality grade on NEC semiconductor devices	IEI-1209
Semiconductor device mounting technology manual	IEI-1207
Semiconductor device package manual	IEI-1213
Guide to quality assurance for semiconductor devices	MEI-1202
Semiconductor selection guide	MF-1134
Power MOS FET features and application switching power supply	TEA-1034
Application circuits using Power MOS FET	TEA-1035
Safe operating area of Power MOS FET	TEA-1037

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Anti-radioactive design is not implemented in this product.