NEC

Compound Field Effect Power Transistor

μPA1520B

N-CHANNEL POWER MOS FET ARRAY SWITCHING USE

DESCRIPTION

The μPA1520B is N-channel Power MOS FET Array that built in 4 circuits designed for solenoid, motor and lamp driver.

FEATURES

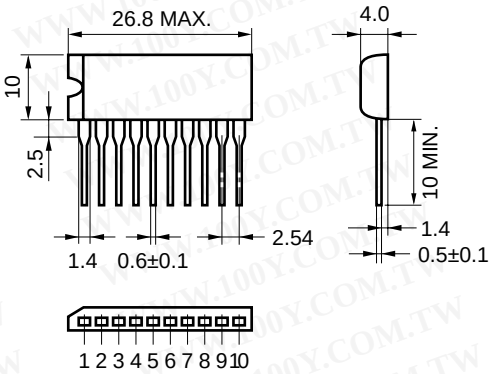
- 4 V driving is possible
- Large Current and Low On-state Resistance
  $I_{D(DC)}$ = ±2.0 A
  $R_{DS(on)}$ 1 ≤ 0.17 Ω MAX. (V_{GS} = 10 V, I_D = 1 A)
  $R_{DS(on)}$ 1 ≤ 0.25 Ω MAX. (V_{GS} = 4 V, I_D = 1 A)
- Low Input Capacitance Ciss = 220 pF TYP.

ORDERING INFORMATION

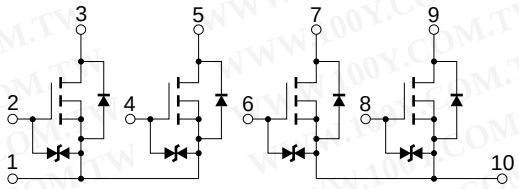
Type Number	Package
μPA1520BH	10 Pin SIP

PACKAGE DIMENSIONS

in millimeters



CONNECTION DIAGRAM



ELECTRODE CONNECTION

2, 4, 6, 8 : Gate
3, 5, 7, 9 : Drain
1, 10 : Source

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Drain to Source Voltage	V_{DSS} Note 1	30	V
Gate to Source Voltage	V_{GSS} Note 2	±20	V
Drain Current (DC)	$I_{D(DC)}$	±2.0	A/unit
Drain Current (pulse)	$I_{D(pulse)}$ Note 3	±8.0	A/unit
Total Power Dissipation	P_{T1} Note 4	28	W
Total Power Dissipation	P_{T2} Note 5	3.5	W
Channel Temperature	T_{CH}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Notes 1. V_{GS} = 0 **2.** V_{DS} = 0
3. PW ≤ 10 μs, Duty Cycle ≤ 1 % **4.** 4 circuits, T_C = 25 °C
3. 4 circuits, T_A = 25 °C

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.

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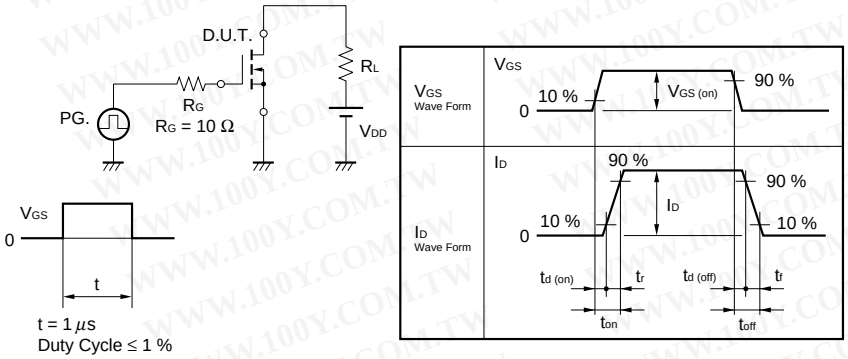
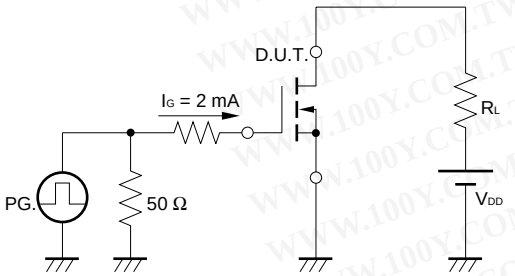
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain Leakage Current	I_{DSS}	V_{DS} = 30 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_{DS} = 10 V, I_D = 1.0 A	1.0			S
Drain to Source On-State Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 1.0 A		0.10	0.17	Ω
	$R_{DS(on)2}$	V_{GS} = 4.0 V, I_D = 1.0 A		0.13	0.25	Ω
Input Capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0, f = 1.0 MHz		220		pF
Output Capacitance	C_{oss}			220		pF
Reverse Transfer Capacitance	C_{rss}			90		pF
Turn-on Delay Time	$t_{d(on)}$	I_D = 1.0 A, V_{GS} = 10 V, V_{DD} ≒ 15 V,		27		ns
Rise Time	t_r	R_L = 15 Ω		125		ns
Turn-off Delay Time	$t_{d(off)}$			590		ns
Fall Time	t_f			500		ns
Total Gate Charge	Q_G	V_{GS} = 10 V, I_D = 2.0 A, V_{DD} = 24 V		14		nC
Gate to Source Charge	Q_{GS}			2		nC
Gate to Drain Charge	Q_{GD}			5.5		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 2.0 A, V_{GS} = 0		1.0		V
Reverse Recovery Time	t_{rr}	I_F = 2.0 A, V_{GS} = 0, di/dt = 50 A/μs		640		ns
Reverse Recovery Charge	Q_{rr}			3.4		μC

Test Circuit 1 Switching Time

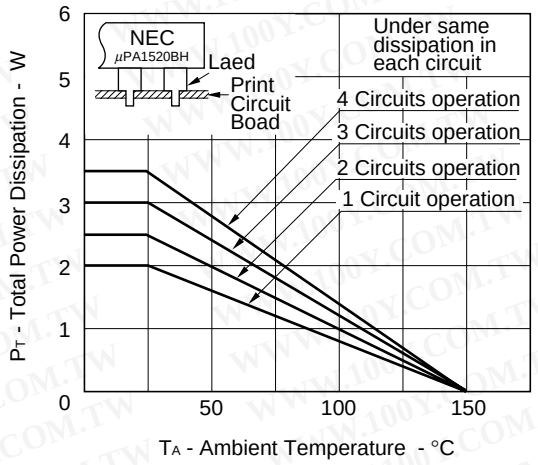


Test Circuit 2 Gate Charge

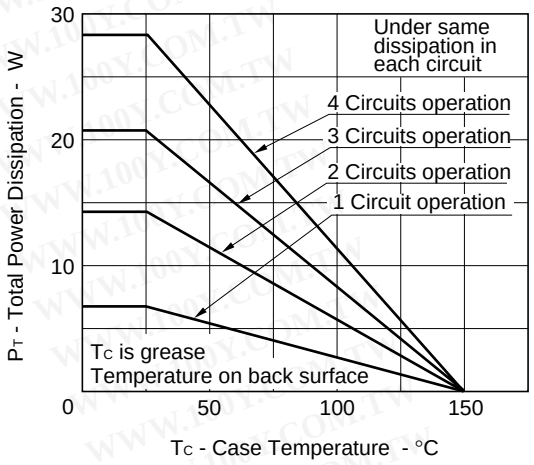


CHARACTERISTICS (T_A = 25 °C)

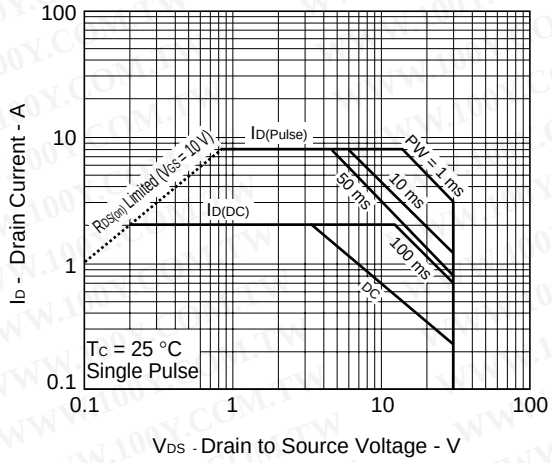
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



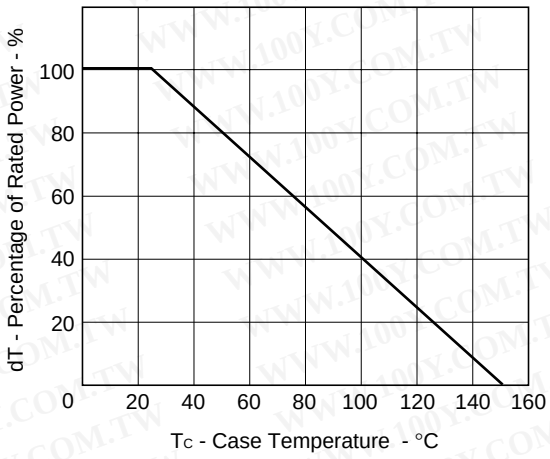
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



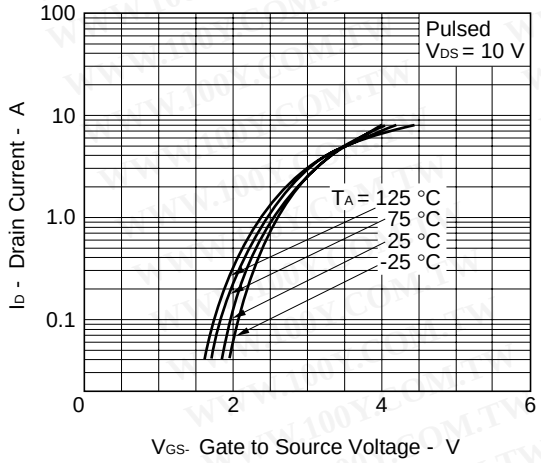
FORWARD BIAS SAFE OPERATING AREA



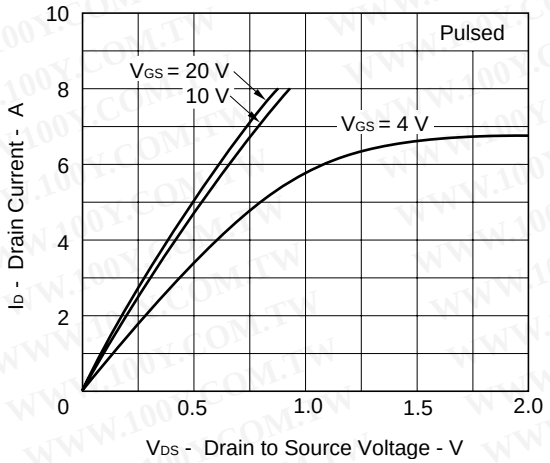
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



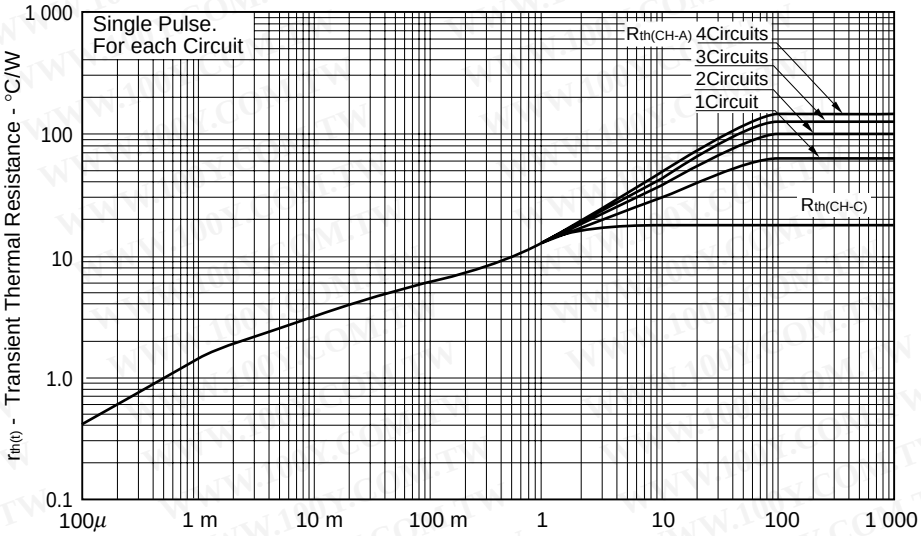
FORWARD TRANSFER CHARACTERISTICS



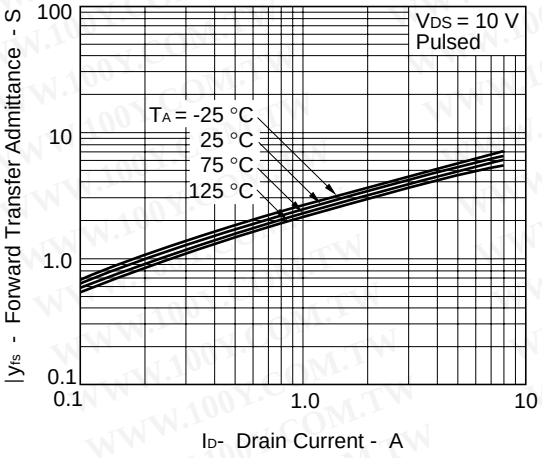
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



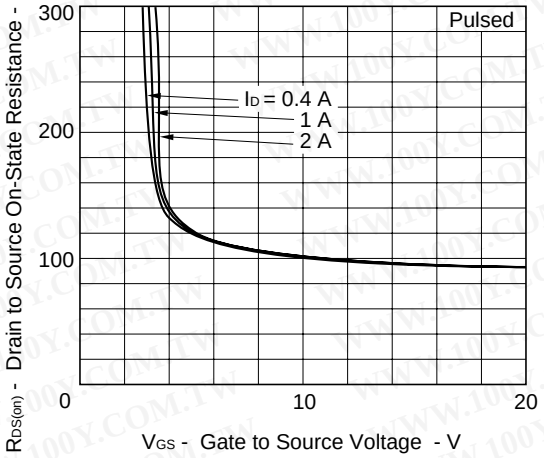
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



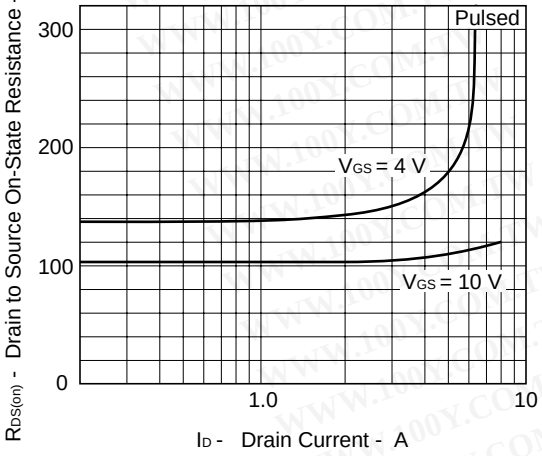
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



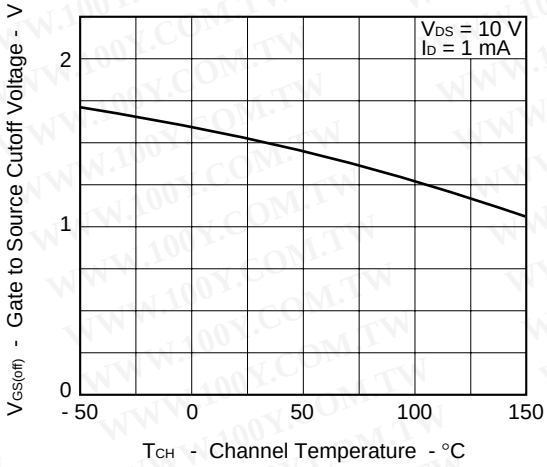
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



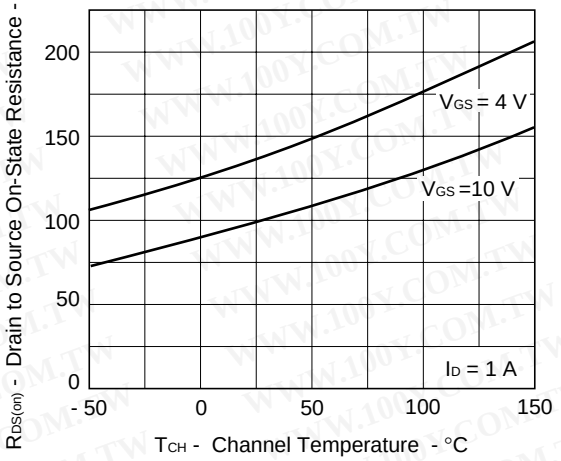
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



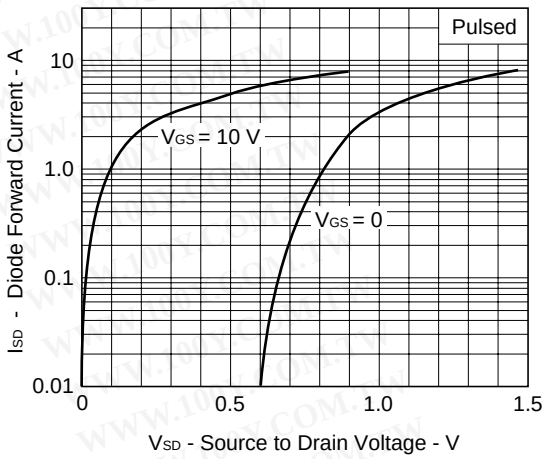
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



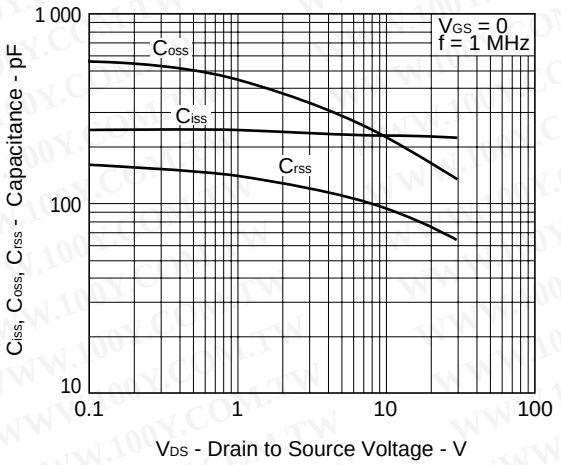
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



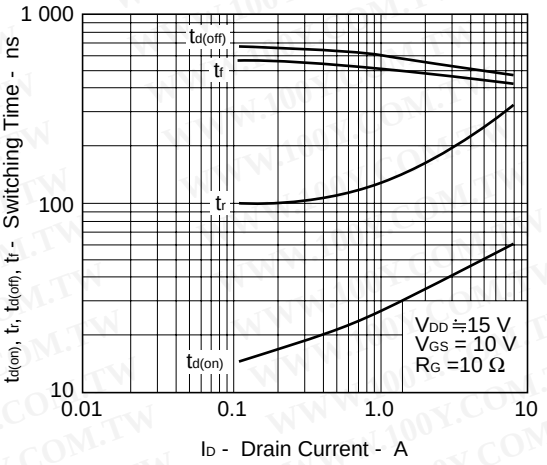
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



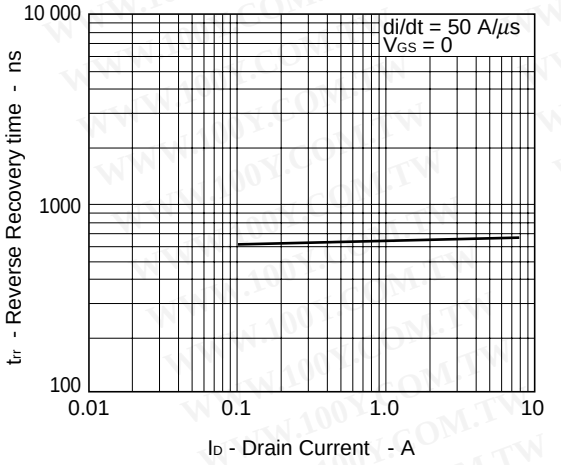
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



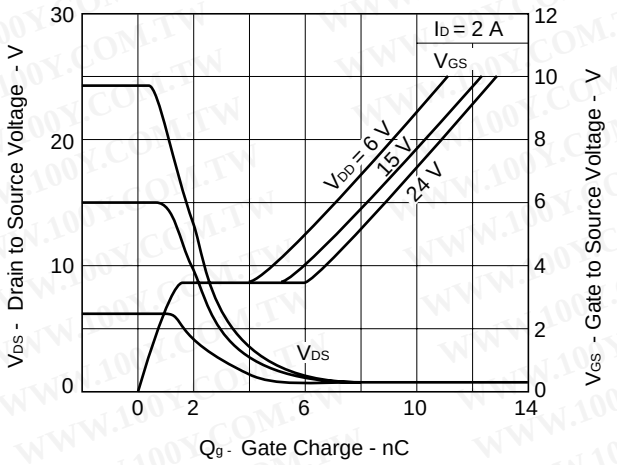
SWITCHING CHARACTERISTICS



REVERSE RECOVERY TIME vs. DRAIN CURRENT



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



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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