

**TOSHIBA**

**MP4401**

TOSHIBA POWER MOS FET MODULE SILICON N CHANNEL MOS TYPE (L<sup>2</sup>-π-MOSIII 4 IN 1)

# MP4401

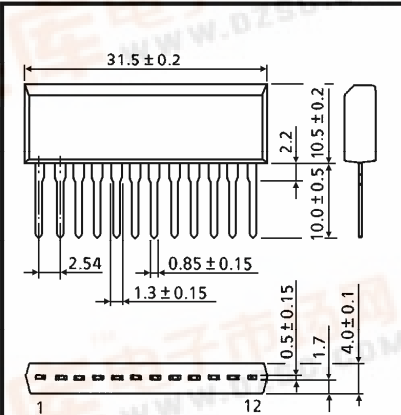
HIGH POWER, HIGH SPEED SWITCHING APPLICATIONS.

HAMMER DRIVE, PULSE MOTOR DRIVE AND INDUCTIVE LOAD SWITCHING.

INDUSTRIAL APPLICATIONS

Unit in mm

- 4-Volt Gate Drive Available
- Small Package by Full Molding (SIP 12 Pin)
- High Drain Power Dissipation (4 Devices Operation)  
:  $P_T = 28W$  ( $T_c = 25^\circ C$ )
- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.33\Omega$  (Typ.)
- Low Leakage Current :  $I_{GSS} = \pm 10\mu A$  (Max.) ( $V_{GS} = \pm 16V$ )  
 $I_{DSS} = 100\mu A$  (Max.) ( $V_{DS} = 120V$ )
- Enhancement-Mode :  $V_{th} = 0.8 \sim 2.0V$  ( $I_D = 1mA$ )



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

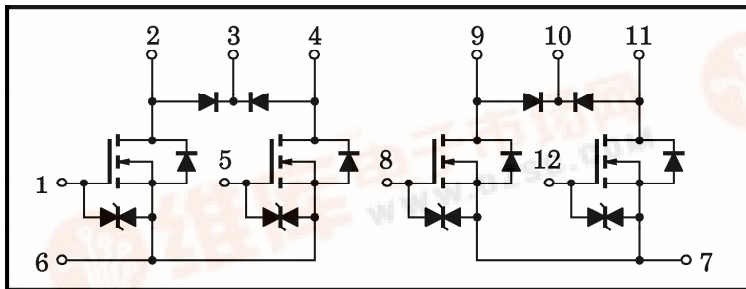
MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DSS}$	120	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current	$I_D$	3	A
Peak Drain Current	$I_{DP}$	12	A
Drain Power Dissipation (1 Device Operation)	$P_D$	2.2	W
Drain Power Dissipation (4 Devices Operation)	$T_a = 25^\circ C$	4.4	W
	$T_c = 25^\circ C$	28	
Channel Temperature	$T_{ch}$	150	$^\circ C$
Storage Temperature Range	$T_{stg}$	$-55 \sim 150$	$^\circ C$

JEDEC	—
EIAJ	—
TOSHIBA	2-32C1D

Weight : 3.9g

ARRAY CONFIGURATION



961001EAA2

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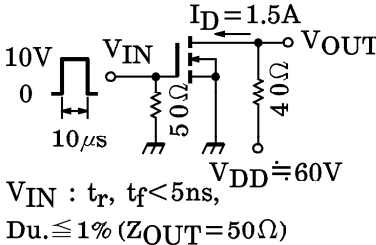


**THERMAL CHARACTERISTICS**

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance of Channel to Ambient (4 Devices Operation, Ta=25°C)	$\Sigma R_{th(ch-a)}$	28.4	°C / W
Thermal Resistance of Channel to Case (4 Devices Operation, Tc=25°C)	$\Sigma R_{th(ch-c)}$	4.46	°C / W
Maximum Lead Temperature for Soldering Purposes (3.2mm from Case for 10s)	T <sub>L</sub>	260	°C

This Transistor is an Electrostatic Sensitive Device. Please Handle with Caution.

**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0	—	—	±10	μA	
Drain Cut-off Current	I <sub>DSS</sub>	V <sub>DS</sub> = 120V, V <sub>GS</sub> = 0	—	—	100	μA	
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	I <sub>D</sub> = 10mA, V <sub>GS</sub> = 0	120	—	—	V	
Gate Threshold Voltage	V <sub>th</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 1mA	0.8	—	2.0	V	
Forward Transfer Admittance	Y <sub>fs</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 1.5A	1.5	3.2	—	S	
Drain-Source ON Resistance	R <sub>D(S)ON</sub>	I <sub>D</sub> = 1.5A, V <sub>GS</sub> = 4V	—	0.42	0.74	Ω	
	R <sub>D(S)ON</sub>	I <sub>D</sub> = 1.5A, V <sub>GS</sub> = 10V	—	0.33	0.45		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0, f = 1MHz	—	350	—	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0, f = 1MHz	—	35	—	pF	
Output Capacitance	C <sub>oss</sub>	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0, f = 1MHz	—	155	—	pF	
Switching Time	Rise Time	t <sub>r</sub>		—	6	—	ns
	Turn-on Time	t <sub>on</sub>		—	12	—	
	Fall Time	t <sub>f</sub>		—	40	—	
	Turn-off Time	t <sub>off</sub>		—	100	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)	Q <sub>g</sub>	I <sub>D</sub> = 3A, V <sub>GS</sub> = 10V, V <sub>DD</sub> = 96V	—	11	—	nC	
Gate-Source Charge	Q <sub>gs</sub>		—	7	—		
Gate-Drain (“Miller”) Charge	Q <sub>gd</sub>		—	4	—		

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Drain Reverse Current	$I_{DR}$	—	—	—	3	A
Peak Drain Reverse Current	$I_{DRP}$	—	—	—	12	A
Diode Forward Voltage	$V_{DSF}$	$I_{DR} = 3A, V_{GS} = 0$	—	-0.9	-1.5	V
Reverse Recovery Time	$t_{rr}$	$I_{DR} = 3A, V_{GS} = 0,$ $dI_{DR} / dt = -20A / \mu s$	—	130	—	ns
Reverse Recovery Charge	$Q_{rr}$		—	0.14	—	$\mu C$

## FLYBACK-DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Maximum Forward Current	$I_{FM}$	—	—	—	3	A
Reverse Current	$I_R$	$V_R = 120V$	—	—	0.4	$\mu A$
Reverse Voltage	$V_R$	$I_R = 100\mu A$	120	—	—	V
Forward Voltage	$V_F$	$I_F = 0.5A$	—	—	1.8	V

